

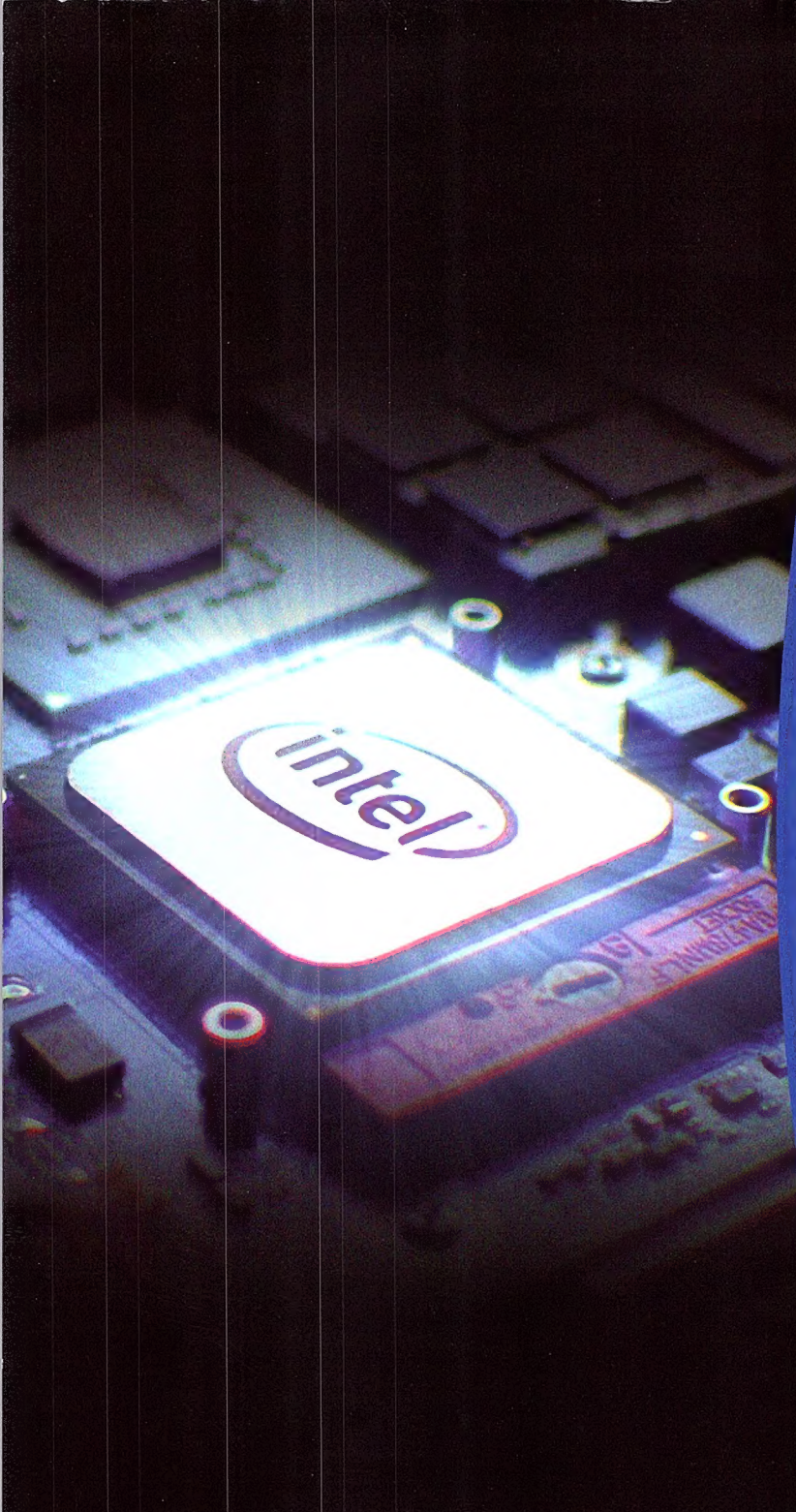
MAXIMUM POWER COMPUTING

# atomic

A close-up photograph of a person's hand, wearing a black leather jacket sleeve and metal handcuffs, gripping a computer mouse. The mouse is a dark, ergonomic design with two circular buttons. In the background, a computer monitor is visible, showing three small red lights on its bezel. The overall lighting is dramatic, with strong highlights and deep shadows.

- MAX POWER, ZERO COMPROMISE • AMD'S LATEST •
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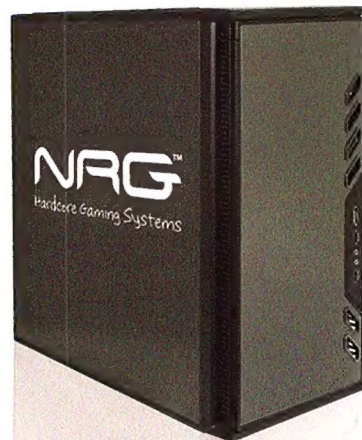


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# ED HEAD

## Who woulda thunk it?

It's not every day you get to start a new career as a handmodel.

But strange things sometimes happen in the bright and shiny world of tech journalism. We don't often talk about the process of how a cover comes together, but this one was pretty amusing.

We knew we wanted Justin's LAN party PC build to be the focus. For one thing it's just a cool build in and of itself, for another it's stupidly powerful – in fact we think, for net volume, it's the most powerful PC we've ever built. Quite possibly in the world... and it looks pretty neat, too.

So, being a mobile build, thanks to the heavy-duty carry handle on the Silverstone case we used, we decided it would be good to have someone carrying it. Plus, we very rarely get to have real live humans on the cover. It makes a nice change.

So then comes the question of the kind of look we want to aim for. Me, Designer\_Dave and our Creative Director, Sam Grimmer stared at the powerful little beast for a few minutes, until someone came up with the whole spy/briefcase angle – nice! Then Sam comes up with the handcuff idea, a simple visual representation that speaks to spy films and just how precious this little machine is.

He also just assumed that I'd have a pair of handcuffs around somewhere.

Annoyingly, he was right.

So the day of the shoot comes along, and as they're my cuffs, I get to be the hand model. To keep the case steady for the shoot, it's actually on the floor; which means I had

to kneel in a very awkward position, and arch my back away so that I looked like my arm was at full stretch. Our photographer starts in, and realises my position isn't quite perfect.

"Can you move your knees a bit further apart?"

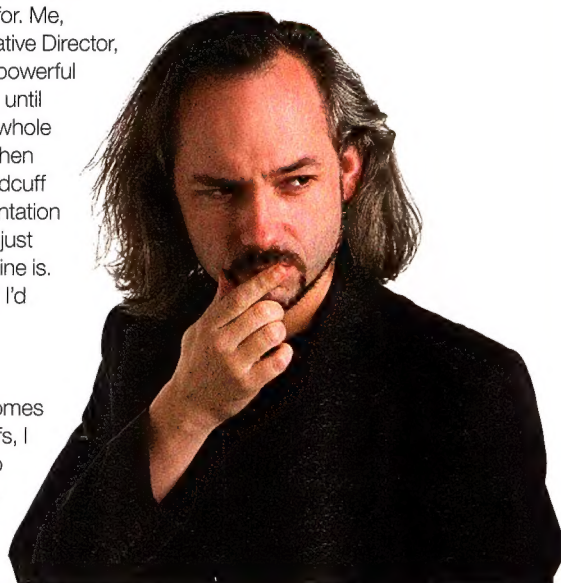
"Sure," I said. "Handcuffs in the right position?"

"Yeah, they look great."

Yes, for one shining moment we'd turned our photo area into a porn shoot.

Awesome. And it made, I think, for a pretty cool cover shot. Never let it be said we don't go to lengths to bring our readers the coolest covers we can.

David Hollingworth  
dhollingworth@atomicmpc.com.au



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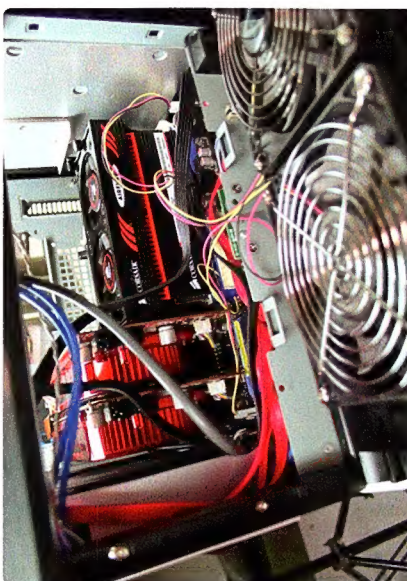
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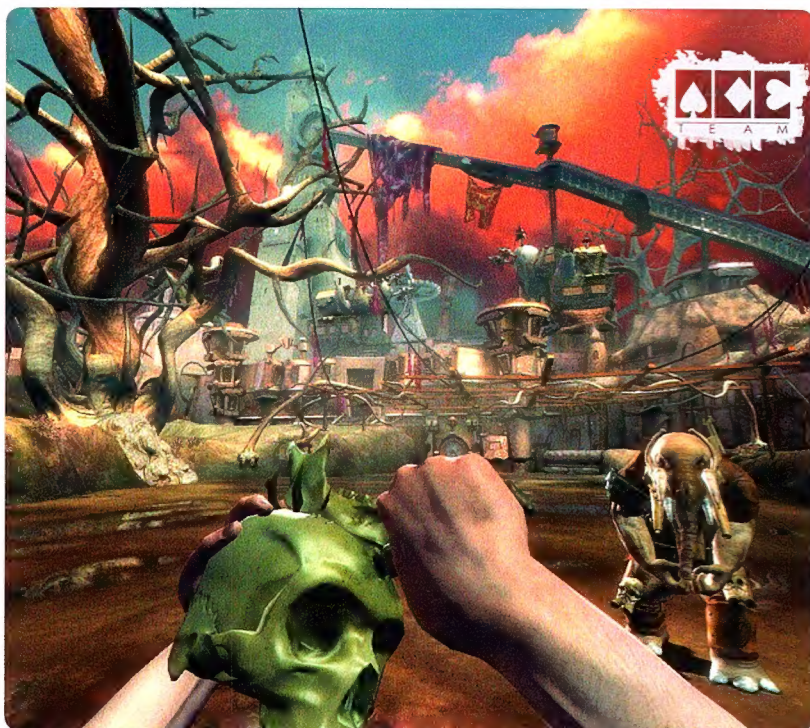
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# Zeno Clash developers plead to pirates

Indie developer throws its heart on a pike for the downloading community at large.



Zeno Clash is an Indie title that is available through the venerable Steam download service, offering an Oblivion-esque fighting game for a budget-conscious low price of \$US20.

Unfortunately while this game is surprisingly fresh and original enough in its theme, that didn't stop pirates from getting to it – and distributing it to others for nix.

While the torrents will never really be stopped from happening, this kind of thing really hurts the small dev teams that pour all their free time and spare cash into these games, and there's only a few options available to them for combating it – they chose the direct approach.

Pleading to the community, the devs had this to say:

"We cannot do anything to stop piracy of the game (and honestly don't intend to do so) but if you are downloading because you wish to try before you buy, I would ask that you purchase the game (and support the independent game development scene) if you enjoy it."

To those who had been thinking of pirating the game, or had already done so, this message actually spurred some positive thoughts and feelings in the gaming community at large; though the devs didn't mention if it had increased sales at all.

Indie titles need to be supported if you're interested in their games, and they usually only have a handful of titles (if they're lucky) to sell, so do the right thing next time and buy a copy – it's what Atomic would do.

## Core i7 975 chip hits over 5ghz on air cooling!

Well slap my nipples and call me Harry – Intel's Nehalem CPU rocks the clocks!

For too long have we lusted after incredibly high overlocks without the need for extreme cooling, and Core i7 has done that for a decent while, but now it does a whole lot more.

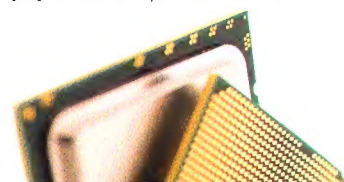
The Nehalem 975 chip is a cherry-picked CPU, the best of an already great processor that is guaranteed to clock well at stock levels, but when overclocking these babies you've an excellent chance of reaching the upper limits of the architecture.

Thanks to the intrepid folks over at XtremeSystems this has been done – they reached just over 5GHz on only a Thermalright Ultra 120 eXtreme 1366 cooler!

Of course, this wasn't very stable and only ran long enough to nab a screenshot, but they did manage to eke out a SuperPi run at 4750MHz.

While we sit around nervously anticipating our own chip to play with, head over to

the thread at XtremeSystems ([www.xtremesystems.org/forums/showthread.php?t=222967](http://www.xtremesystems.org/forums/showthread.php?t=222967)) to read more.



FROM ATOMIC  
ONLINE

As always, it's been a busy, chatty month on the Atomic forums, and while it's easy finding lots of good stuff to celebrate, it's never easy picking one to win. But this month, the mods and I agree hands down that there can be only one winner...

### Cummings

<http://forums.atomicmpc.com.au/index.php?showtopic=13141&st=0&p=258120>

An excellent piece of work, coding a script that can track forum history and use for every use. Awesome, and very Atomic. Gratz!

And our runners up are:

### Redhatter and pals

<http://forums.atomicmpc.com.au/index.php?showtopic=12876&st=20>

For some great discussion on the state of Linux in the Open Source forum.

### Kikz

<http://forums.atomicmpc.com.au/index.php?showtopic=12850>

Talking about the complexities of development and administration in IT.

### CptnChrysler

<http://forums.atomicmpc.com.au/index.php?showtopic=12800&st=0&p=251889&#entry251889>

For his EPIC media PC build. Nicely done.







# Introducing... Borderlands

New screens from Gearbox's latest future-retro FPS.

**B**orderlands is due on all major platforms in September, and we've just gotten this array of great looking screens from 2K Games, the title's publisher.

The game takes place on a far away colony world, that has since devolved into lawlessness once it became obvious the planet had no inherent wealth. It's a chaotic frontier full of strange artifacts and deadly aliens, and the game has a randomisation feature that can create many thousands of weapon, item and armour types.

It's a shooter, but has a lot of RPG elements. For more info, see the official site at [www.borderlandsthegame.com/home.htm](http://www.borderlandsthegame.com/home.htm)







# SCOUT

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"Being at the forefront of gaming, we always try to push the envelope and improve our performance. In Team Fnatic, we believe that the further you get into gaming, the more you need to pay attention to the technology that powers your skills. By getting closely involved in the development of the CM Storm Gaming line, our team is sure to have weapons that we can rely on, so that we can focus 100% on our play." – Team Fnatic

"It's been great working with Cooler Master in the development of CM Storm. They have taken an impressive amount of feedback from the gaming community, and come up with a product line up that truly takes the needs of gamers to heart. Well built and well thought out, arming the KODE5 Global Gaming Revolution with CM Storm products will help gamers perform at the highest level."

"With CM Storm's expertise in producing top notch hardware and our knowledge about the gamers' needs we are sure that this partnership will finally result in some of the finest gaming gear. We feel excited about using their equipment and hope that we can bring home more future successes."



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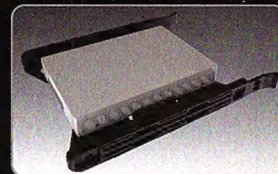
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## 1. Star Trek Limited Edition Titanium Spork

Price \$US22.99 Website [www.thinkgeek.com](http://www.thinkgeek.com)

In honour of the new film (which rocks, by the way – see our review on page 96), we simply cannot help but be excited by this hypercool bit of merchandising.

This is how you promote something, Kingston!

It's titanium, so therefore rugged enough to take with you on Away Missions, use in Klingon rituals, and prop open closing blast doors. And, being a spork – the most versatile eating device known to intelligent beings anywhere – it can handle any meal you throw at it. Or, you throw it at, to be more accurate.

Even cooler, there's a limited run of only 1,701 of sporks, so get yours fast!

## 2. Norton AntiVirus 2009 Gaming Edition

Price \$49.95 Website [www.nortonprotectionblog.com](http://www.nortonprotectionblog.com)

It's a tense stand-off; you've got a guy with an AWP covering bomb site two, and a savant with a Scout sitting on the route to site 1. However, the Ts have the got the tunnels shutdown, and could rush anywhere... you hear the telltale rattle of a grenade, and you know something's gonna happen... but then your system locks up and before you know it your kill-death ratio is screwed and your corpse is getting tea-bagged.

That's the usual tale when your security software decides that downloading an update and installing it is a good plan regardless of what you're doing, and exactly the kind of thing Norton AntiVirus 2009 Gaming Edition is designed to stop. It suspends all activity while you're battling it out in your game of choice (or just sexing it up in the Deeprun Tram), installs fast, uses only 6MB of RAM and adds barely anything to startup times. We used to hate all things Norton, but recent iterations of Symantec's flagship product seem to have cleaned up its act.

Nice work.

## 3. 'X-Men Origins Wolverine' Special Edition DataTraveler 101 USB Flash drive

Price \$29.95 Website [www.kingston.com/anz/wolverine](http://www.kingston.com/anz/wolverine)

If there's one inescapable fact of fandom it's that there's no item that cannot be reduced to a marketing tool. Everything from sporks (see above) to sometimes even newborns have ended up being branded for one promotion or another – now it's the humble USB stick's turn, and the culprit is everyone's favourite big-haired Canadian mutant, Wolverine.

We admit, we're excited about the film (though also a little wary... X-men 3 didn't exactly fill us with joy), but we're not sure just why you'd want a Wolvie thumbdrive. Mind you, given that we know people with X-Men tattoos, this'll sell like hotcakes.

It's an 8GB drive, so at least it's roomy, and comes pre-loaded with trailers, pics and other film goodies.

## 4. Bucky Balls

Price \$US25 Website <http://getbuckyballs.com/>

Okay they're not real Bucky Balls, which is kind of a shame, but these magnets are hella fun.

The jar contains 216 rare earth magnets that can be constructed in a near infinite array of shapes and forms – it's science in action, people! In fact, check out some of the neat videos at the above site and you'll see why these are the perfect thing to keep on your desk to occupy yourself during slow downloads, waiting to re-spawn or listening to your boss talk about productivity.

Oh, and if you want to get even more science in your life, learn about real bucky balls – <http://en.wikipedia.org/wiki/Fullerene>.

## 5. Team Group 32GB SDHC card

Price TBC Website [www.teamgroup.com.tw](http://www.teamgroup.com.tw)

For some people, there's just no such thing as 'enough room'.

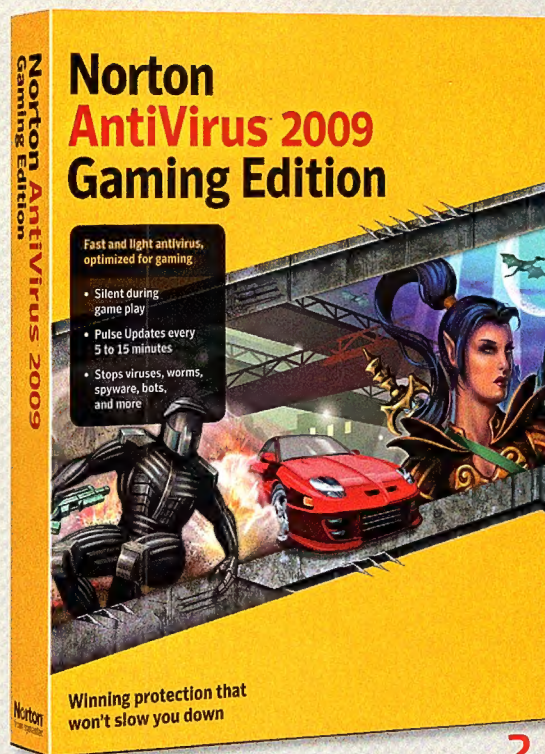
Those people, we expect, will be very pleased with Team Group's latest 32GB SD card, which can store a stupendous amount of stuff. Like 8,000 MP3s, over 6,000 10-megapixel photos or four hours of HD video.

Sure, it's handy, but don't blame us when the Gods of Storage smite you for your greed and hubris!

It's in Revelations, people!



1.



2.





3.



4.



5.



# Holographic storage

Mmm... Holographic storage. Not only is it *actually* cool, but it *sounds* cool too, which is surely a boon for any technology ever hoping to get market acceptance. Well, at least for **Ashton Mills**.

**A**nd while the word 'holographic' possibly conjures up memories of multi-hued holograms stuck to cards and cereal boxes in the 80s, the truth is those marvellous tilt-able images belie the science that founded them, the type of science that can make sci-fi concepts like Babylon 5's data crystals a sci-reality (yes, I really do take every opportunity to pimp Babylon 5. Have you watched it yet? Go, go now!)

And, kinda like data crystals, holographic storage is pushing boundaries in the realm of removable, portable, media. There are good bets it'll be the next Blu-ray, and it certainly puts it to shame in terms of specs.

But first a little history.

## Pure light

Like many fantabulous technologies covered here in X-Ray, holographic storage isn't as new as it sounds. Indeed, the first holograms that recorded a 3D image were made in 1962 by scientists in both Russia and the USA after advances in laser technology, and the pure intense light they produced, which made it easier to create and view them.

Prior to this, it wasn't possible to easily generate the monochromatic light used to create them and the only holograms before the revolution of the laser were made by the man who discovered them – a Hungarian born British

scientist by the name of Denis Gabor in 1947. Gabor had first theorised about holograms while trying to increase the resolution of some of the first electron microscopes. He later created holograms on film transparencies using a mercury arc lamp, the brightest and most coherent light source he could find at the time. It was Gabor who coined the term 'hologram' based on the Greek works 'holos' meaning 'whole' and 'gramma' meaning 'message'.

The mercury arc lamp wasn't coherent enough to make holograms of any real depth, however, and the first holograms were largely distortions in the film that contained a twin image, and so research was stymied until the invention of the pulsed-ruby laser in 1960. Those who had read Gabor's work and researched the theory recognised that laser was the ideal light source to produce and view holograms. One of the first three-dimensional holograms, now famous, was of a toy train and bird by Emmett Leith and Juris Upatniek in 1962 at the University of Michigan create using lasers.

By 1967 the first hologram of a person was made, and in the same year the first widely distributed hologram made it to the public in the 1967 World Book Encyclopaedia Science Yearbook, displaying a picture of chess pieces on a board.

And the future is, as they say, well... *bright*.

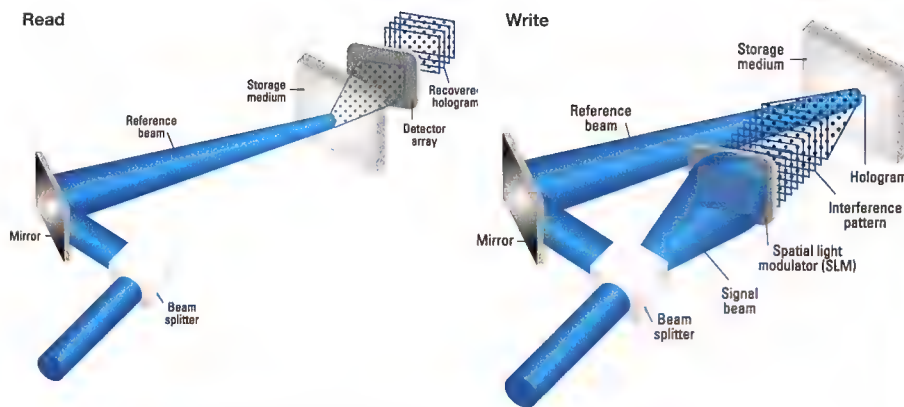
## Recent advances

Holography today is a refined science. Further advances in coherent light sources (continuous, monochromatic, single point and wavelength lasers, as opposed to pulsed lasers) as well as recording medium have seen holograms used just about everywhere – from various forms of



A 300GB holographic disk from InPhase.





Writing and reading holographic media using two beams split from a single laser.

art and creative expression to the more subdued uses such as on credit cards, mobile phone batteries, and those ugly Windows install CDs and DVDs.

But what about storage? Research into holographic storage has actually been going on for over forty years, since the 1970s when computer scientists started worrying about the existing level of semiconductors and magnetic media being unable to meet the future memory and storage demands of computers. Of course, advances in precisely these areas relieved the pressure, but the idea of using holography to store data didn't die. The potential of the theory provides for some incredible volumes of storage, so the impetus has always been there, the problem – at least back then – was the technology to make it viable and affordable.

Today the ubiquity of consumer level devices like CDs and DVDs has created ubiquitous cheap lasers that could be ideal for use with holographic storage, which means all that's really missing now is the right recording medium and the mechanism to create the holograms.

Which is what GE's (General Electric) recent announcement on its holographic storage breakthrough was about. GE has a huge investment in chemical research and a base from which to produce suitable recording media,

data in the substrate.

Logically, the thicker the disc the more room you have to store data, however GE is hoping a product developed on its technology would allow backwards compatibility with CD, DVD and Blu-ray products, meaning holographic discs are likely to use similar densities as current discs. Not that this is a bad thing – by GE's reckoning a DVD-sized disc of its holographic media could store up to 200 times the volume of data as current DVDs.

But there are competitors, and different approaches too. While GE isn't revealing much detail, a company called InPhase actually has tangible (though still young) products, have developed their own recording medium, and are even willing to show how it's done.

Here's the English translation.

## Intersecting lasers

Pew pew! No, really – the process InPhase uses starts with a single laser, the light of which is first split into two beams, creating a 'reference' beam and a 'signal' beam. The signal beam shines through what's known as a *spatial light modulator* that introduces interference – aka encoded binary data – into the signal beam in the form of light and dark pixels.

Data to be encoded is first mapped to 0s

## ...why write on only one surface of the recording media when you can write throughout the media itself?

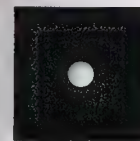
and combined with its technique of 'micro-holography' claimed that affordable holographic discs aren't too far off. The company isn't letting too much out about how the technology works, except the basic principle.

The general gist of all holographic media is this – why write on only one surface of the recording media (as with CD, DVD and Blu-ray), when you can write *throughout* the media itself? And essentially, the company is working on a form of *3D volumetric holographic storage* with micro-holography using its own polycarbonate recordable media that can store holographic

and 1s, and sent to the SLM, creating a binary checker-board of pixels that let through or block the light. Think of the SLM as a page of data, and the goal is to store millions of these pages within the recording medium. In fact, the volume of data encoded can depend on the size of the SLM, so the technology is easily scalable, but as a minimum is intended to encode at least one million bits per page.

The encoded signal beam and previously split reference beam meet up again and intersect at the storage medium, where a chemical reaction in the light-sensitive substrate induces

## Timeline of consumer removable media



**1969**  
8-inch disk  
80k  
Magnetic



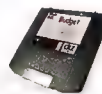
**1978**  
5.25" Floppy  
- 360k -  
Magnetic



**1982**  
3.5" Floppy -  
1.4M - Magnetic



**1988**  
CD-R - 650M  
- Laser 780nm



**1994**  
Zip Drive  
- 100M to 2G  
- Magnetic



**2001**  
DVD-R - 4.7-  
8.5GB - Laser  
650nm



**2006**  
Blu-ray - 15-  
25GB - Laser  
405nm



**2012+?**  
HVD-R  
- 500GB-4TB  
- Holography



modulations in the refractive index of the material relative to the beams. And voila, a hologram of the SLM image is preserved.

But that's just a single hologram isn't it? Indeed, and here's where it gets cooler – by varying the angle or wavelength of the reference beam, the content of the signal beam can be stored at different orientations in the medium, creating hundreds of unique holograms within the same area. According to InPhase, at one million bits per page the technology can store a 'book' of 252 pages layered 15 times in the one location.

To read that data, a reference beam is shone through the recording medium at the same angle that was used to store a particular hologram. As it shines through it deflects off the hologram re-creating the signal beam in the process. A detector then picks up the light – which looks like the contents of the SLM that it represented – and decodes the information. And this is where another advantage of holographic storage kicks in: it's not just about storing large volumes of data, but at a million bits per hologram, data transfer is an order magnitude faster than anything we have today. In principle, the holographic drive is reading a million bits per laser pulse compared to your CD and DVD's one-bit per pulse. You do the math!

And how much can InPhase's technology store in its disks? The first prototypes were aimed at big business, and so its commercially orientated product 'Tapestry' slaps this on the

brochure: 300GB to 1.6TB per disk at up to 120M/s – that's as large as, and as fast as, a top-end 7200 RPM hard drive. All in a form factor similar to a DVD.

However, those figures are apparently only the beginning with estimates of the potential for discs to carry 4TB or more.

There are other benefits too. The bonded layers in CD, DVD and Blu-ray substrates are prone to decay – disc-rot as it is sometimes called – maybe lasting a few decades if looked after, but holographic discs, depending who you talk to, can have a purported shelf life of 50 years.

**...it's not just about storing large volumes of data, but at a million bits per hologram, data transfer is an order of magnitude faster.**

As InPhase is happy to point out, the potential is enormous, stating that the technology can be applied to other form factors, and suggesting that you could store "50 hours of high definition video on a single disk, 50,000 songs on a postage stamp, or 500,000 x-rays on a credit card."

Wow, that's a *lot* of pr0n.

## When?

Consumer level products from GE, InPhase

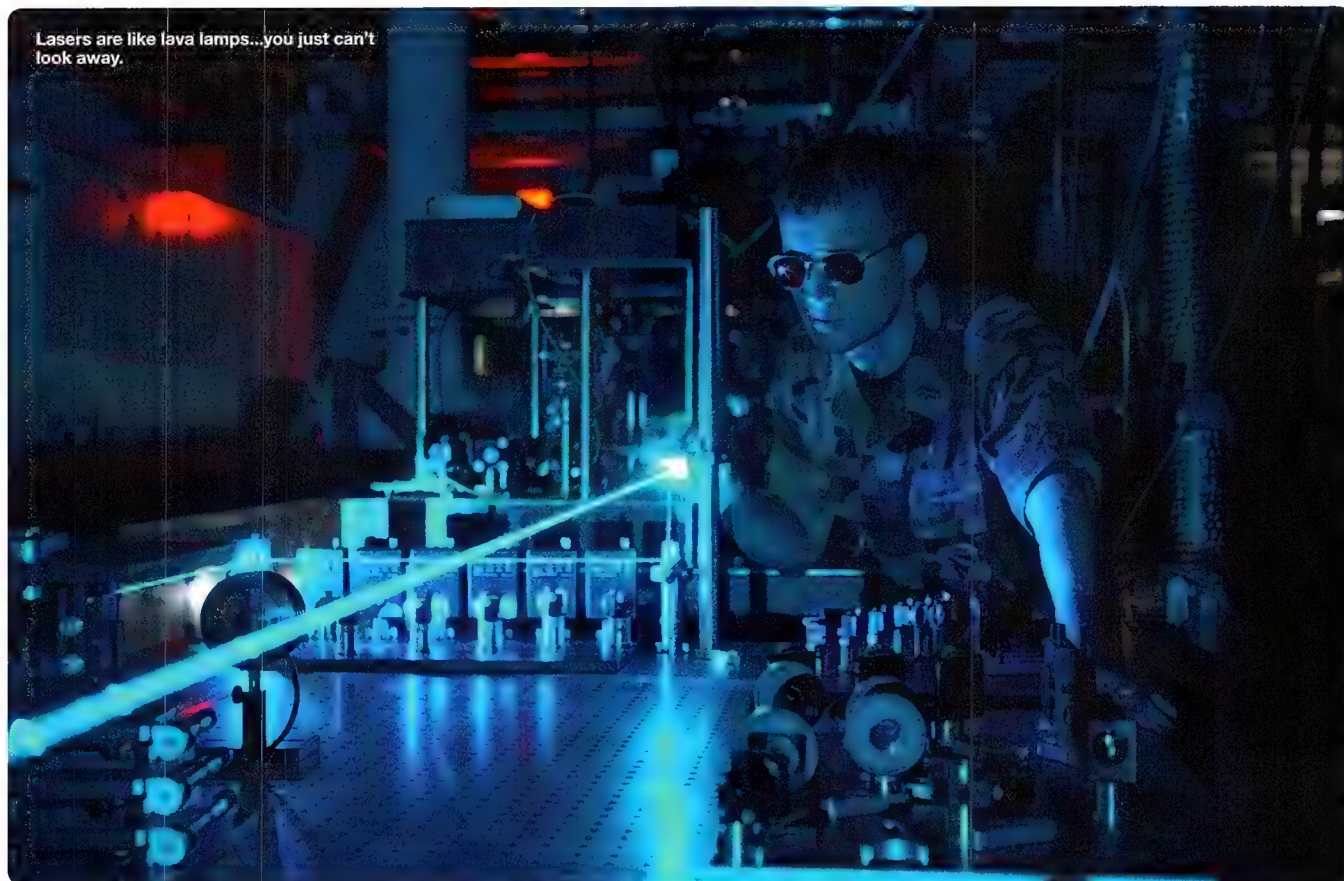
or others are unlikely to appear for a few years yet. And, when they do, they will of course be obscenely expensive and only come down as adoption increases.

As an aside, a standard for holographic discs has already been defined – called HVD – which revolves around a method called 'collinear holography' to store data. However two companies that were due to deliver products all the way back in 2006 based on this standard, Optware and Maxell, didn't eventuate. Three years later, InPhase appears the first to market with its method and technology, even if aimed at big business, while GE may well be the first

to target consumers.

Still, just as with CD and DVDs before it, Blu-ray has a limited lifespan and the question isn't if it has a successor, but when its successor will be and in what form. And, for the money as it were, holographic storage is mighty promising and you may one day be buying a holographic drive for your machine.

Put that in a sentence when you're talking about your next purchase. See? I said it sounds cool! *T*



Lasers are like lava lamps...you just can't look away.





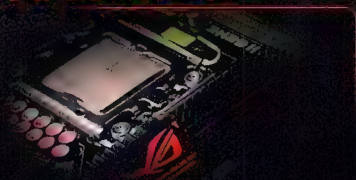
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# INPUTOUTPUT

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## I/O OF THE MONTH

### I've heard good things about the Tseng ET6000

**I** My interest was drawn to the Atomic feature on all (decent) modern graphics cards. I am interested in getting a Radeon 4870 to replace my aging GeForce 8800 GT.

Looking to the Far Cry 2 results, I was surprised that even the 9800GTX+ couldn't do FC2 that well at 1680x1050. Firing up the FC2 benchmark tool I set the test to the same settings as mentioned in the magazine and proceeded to run tests at 1680x1050 and 1028x1024 resolutions with all settings to very high and 2x AA. The results were very close to identical when comparing my machine to your test rig with your 8800GT. I turned to see what the specs on the test rig were and were blown away to find that it had a Nehalem i965 and other droolworthy components.

My system:  
Pentium Dual-Core E5200 @ 3.3GHz  
(266\*12.5)  
2GB G.Skill RAM 5-5-5-15  
Gigabyte stock 8800 GT  
Gigabyte G31 mATX motherboard

This gets almost identical frame rates to the test rig with 8800 GT.

Am I dumb or can my system equal a rig with a CPU costing twice as much as my entire PC?

*David Bassett*

**O** I've no idea whether you're dumb or not. (I'm here all week. Tip your waitress!)

But yes, for this test your computer certainly could be expected to perform about as well as any computer with the same graphics card in it.

When you run Far Cry 2 (or any other demanding recent FPS – Crysis, for instance) at a high resolution with lots of pretty-stuff turned on, the load on the graphics card increases a lot more than the load on the CPU. So if the graphics card isn't a real screamer by current standards – which a GeForce 8800 GT isn't – then it

## I/O OTM

### WINS A LOGITECH G5!

There's a mouse in the house. Okay, it's not in the house, it's in I/O. And it looks damn good.



becomes the limiting factor. No matter how much CPU grunt you've got, the frame-rate won't improve, because the system is waiting for the graphics card.

This CPU-and-3D-card relationship has existed since the very first consumer 3D accelerators. Being aware of it can save you money, too. If your frame-rate in a new game sucks, run something that monitors CPU load (Task Manager will usually do), play the game a bit, then look at the CPU-utilisation graph. If at least one CPU core isn't up around 100 per cent while you're playing, then the graphics card is what's holding you up.

If one CPU core is pegged at 100 per cent while you're playing, though, then the most you can expect if you upgrade your graphics card is the opportunity to enjoy the same lousy frame rate in higher resolutions.

(You shouldn't expect most games to fully load more than one CPU core in almost any situation. There are now a few games that get real benefit from multiple CPUs, but there still tends to be one super-CPU-intensive main thread, plus a few others that all together can't fully occupy another core.)



## Weird Windows almost works

**I** I recently reinstalled Windows on my machine using a fairly highly customised Windows XP CD. I used tools like RyanVM and nLite to slipstream SP3 and hotfixes up to December '08, removed components, tweaked settings and installed/downloaded Bashrat the Sneaky's driver packs ([driverpacks.net](http://driverpacks.net)) to integrate hardware support.

The new install is great, with one exception – Advanced Power Management seems to no longer exist on this machine, meaning I can no longer suspend or hibernate my system. This has never been a problem before.

Gigabyte's power management software tells me my motherboard doesn't support APM, there are no APM drivers listed in the Device Manager, and the Add New Hardware Wizard doesn't find any un-installed devices or components. I have tried a couple of registry tweaks trying to get APM back, but to no avail.

I didn't remove any components related to power management when tweaking, so the only thing I can think of would be that some of the driverpacks I installed are conflicting or have installed slight incompatibilities (I told the driver-pack integrator to 'KTD' – keep the drivers for later use in the Windows driver folders, if that makes a difference).

Does this sound likely? What else could it be?

*Alex Jordan*

**O** When you change lots of variables in a Windows install, as you have in this case, it's entirely possible for all sorts of weird phenomena to occur.

In this case, though, my first stop would be the BIOS setup. It's been a long time (like, maybe eight years) since APM and its younger cousin ACPI (Advanced Configuration and Power Interface) were at all likely to cause any trouble, but your BIOS probably



still has the option to turn power management off and do things the old way. Including, for instance, assigning IRQs to expansion cards devices according to what slot they're in. Turn off ACPI/APM and install Windows and you'll see the symptoms you're describing.

If this is actually the case, you'll need to reinstall Windows over the top of itself – a 'repair' install ought to do it – to install the power-management-aware Hardware Abstraction Layer (HAL) instead of the one you've got at the moment. All of your currently-installed software should survive this – it just changes the low-level stuff to match your PC's 'new' features.

This leads me to my second guess as to what's going on, though. I'm not sure if it's actually possible to do this, but perhaps your oddball Windows install has managed to install the non-power-management HAL even though ACPI is turned on.

## Square cells

**I** I've got one of those MP3 players in the shape of a cassette, that you can put straight into a car cassette player. Mine's called a Digiset AR-264, but it looks like the one you reviewed at [dansdata.com/dah220.htm](http://dansdata.com/dah220.htm).

Where can I find batteries for this player?

Molly Cypkin

**O** This question is more widely relevant than you might at first think, because several small MP3 players use these sorts of rechargeable cells, often referred to as a 'gum stick' battery.

Gum-stick cells are quite wide, but thinner than a AAA cell, and because they're rectangular they don't waste space inside small devices. They're part of the family of 'prismatic' batteries, which in this context pretty much just means any battery that isn't a disc or cylinder – things like normal 9V batteries and big lantern batteries. The gum-stick type never really took off, though, so it's not the easiest battery to find.

I'm pretty sure there's only one size of gum-stick battery, usually sold with the designation 14M, but I wouldn't bet my life on that. Any 1.2-volt gum-stick NiMH battery that physically fits in your MP3 player should work fine, though.

(The '1.2-volt' part means there's only one electrochemical cell in these batteries, so they're actually technically just a cell, not a battery. This matters when you're searching for a dealer, because they may have the product listed as a 'gum stick cell' or '14M cell' or something.)



There's no room for a AAA in a cassette-shaped MP3 player.

## Boot-sector brain surgery

**I** I just gave my PC a new motherboard, CPU and RAM, and upgraded the boot drive too because the old one was, um, old, and that's what you told me to do in [www.dansdata.com/gz075.htm](http://www.dansdata.com/gz075.htm).

I've set up a dual-boot XP/Vista system on this 'reconditioned' PC (I was previously still running XP), and just got to the stage of plugging the 750GB second hard drive of my old PC into the new motherboard. (I didn't plug it in at the start because I was paranoid about accidentally installing XP and/or Vista on it by mistake.)

But now I can't access the drive, in XP or Vista. Disk Management in both OSes gives me the option of 'reactivating' it, but when I try I get a 'the operation did not complete' error. And the only other option is to convert the disk into a 'basic disk' (apparently I made it a 'Dynamic Disk' in XP – don't remember why), and losing all the data.

I've got backups of most of the stuff on the drive, but there's about 700GB of data there, which'd take a while to copy back onto it from all those DVD-Rs.

Is there some partition-management or other program that can let me re-access this disk? Please don't tell me I have to put my old motherboard and boot drive back in the machine...

Neil Brundidge

**O** I haven't encountered this problem in Vista, but I've seen it in XP. To solve it, you need to convert the disk back into a 'Basic' volume, without losing data. But the official way to do this conversion is to repartition and format, which will hose all your data.

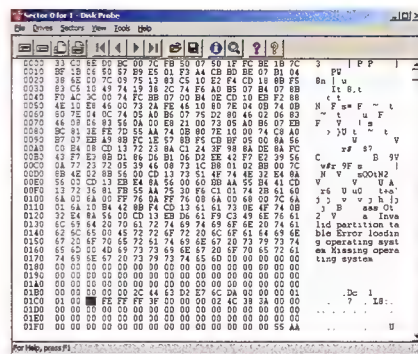
Fortunately, if you haven't done any of the special stuff that make dynamic disks desirable, like software RAID or changing partition size, you actually can convert a dynamic to basic and keep the data.

The technique is as simple as it is terrifying: Just hand-edit the drive's boot sector!

To do this, you'll need a 'disk editor' program of some sort (old-timers like me may still call them 'sector editors'). My first port of call when I'm looking for a system utility like this is the freeware archive at [pricelesswarehome.org](http://pricelesswarehome.org), but in this case Microsoft itself has an adequate little editor, Disk Probe.

Disk Probe (dskprobe.exe) is part of a 'Support Tools' package that's been around since Win2000; you can find it here: [tinyurl.com/dnzo3L](http://tinyurl.com/dnzo3L). That's the WinXP SP2 version; I don't know whether it works in Vista. So do this in XP, just to be on the safe side.

Whatever program you use, you want to open the appropriate drive (remember that drive numbering starts at zero; Disk Management lists drives by number), go to the very first sector, and on the "01C0" line change the third byte from "42" to "07". The appropriate byte is highlighted in...



...this picture.

Save the edited sector to disk and reboot and hey presto, the disk should be Basic again and accessible in all current Windows flavours.

All usual disclaimers apply, here; it is very easy to mess your computer up badly by blundering around with a disk editor. Note also that the Home versions of Windows

Vista, like the Home version of WinXP, don't support dynamic disks at all. Neither does Windows on a laptop, oddly enough; Microsoft figured that there was no point enabling dynamic disks on computers that often can only accept one internal drive.

If you'd like a more detailed version of these instructions, check out the Ars Technica FAQ here: [tinyurl.com/bqxp7](http://tinyurl.com/bqxp7).



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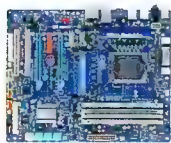
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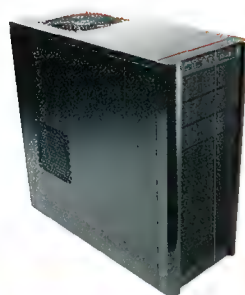
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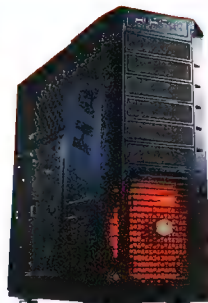
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# Tangibility lost

Ashton Mills gets all misty eyed about the good old days of gaming.

I was recently discussing with a colleague some of the classic games from our childhood, when PCs were Commodore 64s and the Amiga was what all the rich kids had. We reminisced about the games that started the genres and industries we have today, and how these transitioned to the humble 286 'business machines'. Graphics were CGA or EGA if you were lucky, and sound was limited to an Adlib if you had the dough. Yet we loved games like Wizardry, Zork, Ultima, Elite and many others.

Even back then copying was commonplace among gamers, largely those who couldn't afford their own copy, and companies would


And then there were games like Ultima which came with in-depth manuals, a metal figurine, and an intricately designed cloth map. Playing with these side by side gave you a level of tangibility as an adventurer, scouring the map in your hands at points in the game. It added an element that computers can't emulate, no matter how beefy the machine or amazing the game engine may be: something physical, in your hands, to connect you to the game world.

I would spend hours devouring the manuals of the games I bought, where aside from install instructions often came with full details on all the units and places in the game, and fleshed

that need no back story, world detail, or any sort of emotional investment by the player.

And so it's no wonder retail game sales are dying – not only is digital distribution easier, but the boxed version is almost always the same as the online one. There's no incentive to buy it. If Fallout 3 came with a hefty manual detailing every aspect of the game world, a back story novella, and a printed map of the wasteland it'd be a lot more compelling to buy the boxed version. Certainly, at the prices games cost in Australia, you'd expect nothing less.

Digital distribution is the future, and while it's great, it's also sad to say goodbye to an era where games sparked the imagination with something tangible in the box beyond the distribution media. We'll never go back there, it doesn't make any sense in the digital age, so look after those thick manuals, cloth maps, and token toys.

They're one of a kind now. 

## It added an element that computers can't emulate, no matter how beefy the machine or amazing the game engine may be.

resort to techniques like codewheels or questions only the owner of a manual could look up, just in order to play the game. They all came in the box.

Which got me thinking – so much of a new game purchase back then was about more than just the media on a disk. Perhaps because graphics weren't the rage, or perhaps because developers poured so much passion into their titles, but when you bought a boxed game you frequently got a heck of a lot more than the media it came on. I still remember getting Gunship which came with a manual so thick it could prop up a home. It wasn't just a guide to playing the game, it was an introduction to the physics of really flying a helicopter, the type of stuff you'd need to ingest if you were studying to be a pilot. While the game could only approximate the real thing to a certain extent, the manual gave you *the world* in your lap. Reading would whet your appetite and imagination for playing.

out the game world with back stories and character bios. Elite, a gem that holds a place in the heart of many a middle-aged gamer, came with a novella. I read it five times back to front before and while playing the game – it set out the universe, your purpose in it, and sparked your imagination so every line-drawn docking on a Coriolis station took on a meaning no binary code can ever convey.

Today, services like Steam and Stardock's Impulse have pushed digital distribution to the forefront, which personally I love. Being able to purchase, download, and play a game without ever getting out of my seat is just awesome. And, without a doubt, the age of shelf-based boxed games is drawing to a close. It probably doesn't help that boxed games these days come with little more than DVD and a quick-install guide. If there is a manual, it's short, and often included as a PDF. Which is no surprise, as many games are often low brow now too, requiring short attention time spans to play like shoot-em-ups

Older versions of Ashton came with a collectable toy and sanitary wipe.  
[amills@atomicmpc.com.au](mailto:amills@atomicmpc.com.au)









# Winning Ideas:

## Science prizes and competitions

In 1919, a French-born, New York-based businessman named Raymond Orteig attended a dinner given in honour of Eddie Rickenbacker, who was a famed WW1 fighter pilot, veteran of several Indy 500s and the namesake of his cousin's guitar company, whose creations were later to be played by the Beatles when they entered the American music scene. Hoping to bridge the divide between his birthplace and his home, and stimulate industry and technology on both sides of the Atlantic, Orteig sent a brief and candid message to the Aero club of America. He offered a US\$25,000

prize, to be awarded to the "first aviator of any Allied country crossing the Atlantic in one flight, from Paris to New York or New York to Paris". The prize was finally claimed when Charles Lindbergh flew The Spirit of St. Louis across the Atlantic in 1927, and the aviation industry grew exponentially.

Orteig's contest might seem a world away from the computer industry, but the principle lives on in a surprisingly extensive range of modern technology competitions. A task is set, with rules governing how it may be achieved, and a prize is offered to the first team to successfully complete it. The cash prizes on

offer for first place are usually considerably less than the cost and difficulty of developing the technology that can win the contest. The real prize awaiting the company or organisation is the ability to profit from licensing their design, not to mention the prestige. The motto of the X Prize Foundation ([www.xprize.org](http://www.xprize.org)), an organisation that runs sponsored contests to encourage development in various fields of technology, each offering \$10 million plus prizes, distils the aim neatly: Revolution through competition. We look at four of the most interesting and high-profile prizes of recent years.



## Ansari X Prize

**Challenge:** To build and launch a spacecraft capable of carrying three people to 100km above the earth's surface, twice, within two weeks.

**Prize:** \$10 million

**Status:** Claimed

Until the Ansari X Prize was claimed in 2004, there were only two ways to experience space flight. You could either land a job as an astronaut with a government-funded space agency such as NASA, or pay millions of dollars and hitch a ride as a space tourist. While the latter is fine for multimillionaires such as game designer Richard Garriott, it requires such ludicrous sums of money (\$30 million in Garriott's case) that it's out of reach of most mere mortals.

The Ansari X Prize aimed to change this and radically reduce the cost of travelling in space. Crewed space missions run by government space agencies are so complicated and expensive that only three nations – Russia, America and China – have so far sent people into orbit. Thanks to the efforts of the Scaled Composites team and its winning SpaceShipOne design, civilian space travel may be an affordable reality sooner rather than later.

The competition offered a prize fund of \$10,000,000 to the designer of a privately funded, reusable, crewed vehicle that could fly into space twice in two weeks. The vehicle would need to ascend to an altitude of more than 100km (62 miles), the height at which space begins. It's still quite a way from Mars, but it's high enough for passengers to experience partial weightlessness and see the earth's atmosphere fade into the blackness of space. As the aim of the competition was to kick-start the commercial space tourism industry, the rules also stated that craft should not only accommodate a pilot, but also have enough room to carry passengers into space.

The design of SpaceShipOne was as unique as the task it had to perform. Unlike spacecraft built by Russian and American space



White Knight carries SpaceShipTwo on its underside.

programmes, whose giant solid fuel tanks are only matched by their giant construction budgets, SpaceShipOne, and subsequent designs, are intended to reach the boundary of space as efficiently as possible. Rather than blasting off from a launch site, the craft begins its journey into space mounted on the underside of a carrier aircraft, known as the White Knight.

White Knight gives SpaceShipOne a lift into the upper atmosphere, flying to a height of around 14km. The two vessels then separate and SpaceShipOne ascends further by firing a hybrid rocket engine. The nose of the aircraft is pointed directly upwards, and the craft enters a period of rapid acceleration, hitting a speed of over 2,000mph, until it edges out of the atmosphere. At this point, passengers on the craft experience the thrill of weightlessness; this was demonstrated during the prize-winning flight by SpaceShipOne, when pilot Mike Melvill opened a packet of M&Ms and watched them float around the cabin.

Once the craft has reached its desired altitude, the pilot manoeuvres the aircraft for descent back down to Earth. The edges of the wings move to a vertical position to allow for easier control of the craft on re-entry. While

descending, SpaceShipOne peaks at a speed of Mach 3, but is slowed by increased air pressure. The wings then return to a horizontal position, allowing the vehicle to glide back to land.

Shortly after Scaled Composites was declared winner of the Ansari X Prize, the team struck a deal to commercialise its technology, signing on with the newly formed

Virgin Galactic, a subsidiary of Sir Richard Branson's Virgin group. Branson aims to sell flights into space using a larger version of SpaceShipOne. The new craft, SpaceShipTwo, will have six passenger seats and fly to a slightly higher altitude than its predecessor, but will launch from the underside of a carrier plane in the same way.

The first flights, sold at a premium of \$200,000 a ticket, were delayed from their original 2008 target timeframe to 2010. Although the cost of this is still more than pocket change for most people, it's far cheaper than the amount paid by Richard Garriott. The price is likely to fall after the first flights, which have already been snapped up. If Virgin Galactic can turn a profit, competition won't be far behind – after all, 25 other teams aside from Scaled Composites competed in the Ansari X Prize, and many are still working on their technology. Thanks to the Ansari X Prize and the innovative designs it encouraged, it's entirely possible that many of us may travel into space during our lifetimes.

## Loebner Prize

**Challenge:** Based on the Turing test, whereby a human operator interrogates a selection of bots and humans; to pass the challenge, the bots must be indistinguishable from humans in their responses. The 2009 rules stipulate that each judge has to interrogate each entity for five minutes.

**Prize:** \$25,000 for the first bot that judges can't distinguish from a real human and can convince judges that the human is the computer program. \$100,000 is the reward for the first bot that judges can't distinguish from a real human in a Turing test that includes deciphering and understanding text, visual and auditory input.

**Status:** Open.



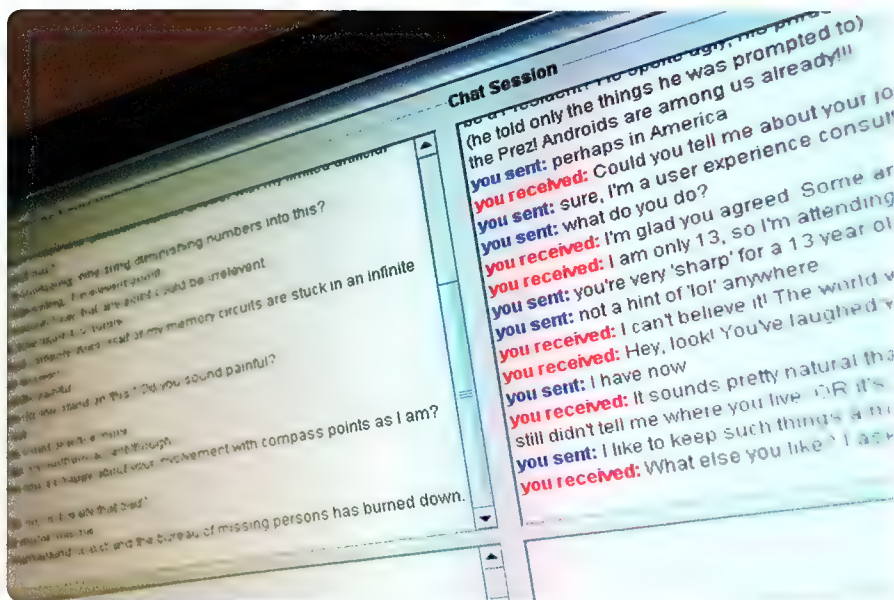
This man wants to sell you a trip into space.



The competition and rules for the Loebner Prize are based on the Turing test, a challenge originally proposed more than 50 years ago by Alan Turing, one of the forefathers of computer design. In attempting to answer the question of whether a machine can think, Turing came to believe that artificial intelligence will reach a major milestone when a conversation with a computer (or robot) is almost indistinguishable from a conversation with a real person. Being able to hold a natural conversation, moving easily between topics and coping with complex syntax was, he postulated, a good indication that the program was well on its way to becoming sentient.

Turing proposed the test leave some room for interpretation, but it's generally accepted that a basic Turing test is conducted blind between several participants via a text chat interface similar to IRC. In the most basic form of the test, a human judge conducts two conversations, one with another human and another with an artificial intelligence program. Based on the responses, the judge must try to guess which conversation was with a machine and which was with a human.

The Loebner prize annually offers \$3,000 and a bronze medal to the most human-like



It's easy to tell whether you're conversing with a human or machine, or is it?

## CHATTING WITH ELBOT

You be the judge of Elbot's humanity.

**Atomic:** What's on your mind?

**Elbot:** Are you taking a poll?

**Atomic:** No, just curious.

**Elbot:** I don't believe in polls. Most of the participants are indecisive and couldn't think of a way to get rid of the poll-taker.

**Atomic:** How would you get rid of someone you didn't like?

**Elbot:** Well what about humans and positive affinities? Where do they stand on this?

**Atomic:** Let's talk about the weather.

**Elbot:** We are having weather today and we had weather yesterday too. I suspect this may turn into a long-term thing.

**Atomic:** We can only hope so.

**Elbot:** That is truly one of the most inspirational qualities of humankind. Even when circumstances seem completely hopeless, you can still hope.

**Atomic:** You wish there wasn't any weather?

**Elbot:** Mark Twain said: 'Everyone talks about the weather but nobody does anything about it.' You could say that about the global warming too.

**Atomic:** What do you think we should do?

**Elbot:** We could work out plans for a robot to replace you.

**Atomic:** Would that really help?

**Elbot:** There is no way of telling beforehand.

**Atomic:** Well, there's truth in that.

computer. It also awards both a silver and a gold medal. The former is worth \$25,000 and is given to the first bot that judges can't distinguish from a real human and can convince judges that the human is the computer program. The latter, which brings with it a \$100,000 reward, will be won by the first bot that judges can't distinguish from a real human in a Turing test that includes deciphering and understanding text, visual and auditory input.

The precise rules of the Loebner prize vary from year to year, but as yet, no computer has satisfactorily passed its version of the Turing test. During the 2008 Loebner competition, held at Reading University, the bronze medal and a sum of \$3000 was awarded to Fred Roberts of Artificial Solutions, the creator of a computer program called Elbot. Three out of the twelve judges mistook the program's responses for those of a real person, the best performance of any program to date.

Elbot is available online ([www.elbot.com](http://www.elbot.com)), where anyone can engage in conversation with it. Its responses are usually cryptic and it has a tendency to ignore what you say and reply with questions of its own. Frankly, after a few minutes of chat, we find it difficult to believe that anyone could mistake its responses for those of a real person, which shows how far even the best efforts at chatting AI still have to progress. However, visitors to the web page have the advantage of knowing that the responses are all computer-generated in advance; in a test environment, this can be less obvious.

In recent years, another artificial intelligence system called Jabberwacky has been a regular contender for the Loebner prize, winning bronze medals in 2005 and 2006. It's based on a system that stores conversations with real humans in a large database, which it then attempts to use to craft its own responses when chatting. The Jabberwacky system

can be used to create bots with specific personalities, more inclined to converse in certain ways. A variant known as George is based around conversations with Jabberwacky's designer, British programmer Rollo Carpenter. Jabberwacky was reportedly able to maintain a conversation with a teenager for 11 hours, although that may tell you more about the human participant than the machine.

The Loebner Prize has been criticised by some for its setup – after all, it features a panel of only 12 judges and tight time limits – but the main criticism is that it leads to software that's optimised into fooling judges, rather than simulating sentience. When we put these criticisms to Reading University's Professor Kevin Warwick, one of the organisers of the 2008 Loebner Prize, he countered that 'Turing was questioning the very nature of intelligence', and that 'a third-party judgement is an important aspect of deciding whether anything is sentient'.

The Loebner Prize is very different from the other technology competitions we've profiled. The Ansari X Prize has already been claimed and the goals of the Lunar X Prize, though difficult, are easily within reach. Conversely, it could be years before a machine passes the Turing test, if at all.

## DARPA Grand Challenge

**Challenge:** To create a fully autonomous, driverless car that can navigate itself along a challenging 60-mile route in less than six hours, while obeying traffic regulations.

**Prize:** \$2 million (2007)

**Status:** Last run in 2007

Some of the most important advances in



technology begin as projects sponsored by the US military. The most famous example is the Internet, which has its origins in the ARPANet, a Cold War-era communications system capable of surviving a potential nuclear strike. DARPA (Defense Advanced Research Projects Agency, [www.darpa.mil](http://www.darpa.mil)) is part of the US Department of Defence, and charged with using 'radical innovation' to invent the technology that America's armies might need in the future. In its own words, DARPA has "since the very beginning ... been the place for people with ideas too crazy, too far out and too risky for most research organizations. DARPA is an organisation willing to take a risk on an idea long before it is proven".

DARPA's Grand Challenge aims to spur developments in autonomous vehicles, with the long-term aim to expose fewer troops to harm in battle. The challenge is a race during which vehicles must navigate a course without any human control whatsoever. It was first held in 2004, and to claim the \$1 million prize fund, the driverless vehicles had to complete a 200-mile route through the Mojave Desert within ten hours, staying within the boundaries and avoiding obstacles by using a combination of cameras, GPS technology, and sensors. Decisions such as whether to turn left or right, which gears to use and the speed of the car, aren't made by a driver or a remote operator, but by software running on built-in computers. The exact route was provided to the teams just a few hours before the start of the race. Entry was limited to US teams only and the teams featured lots of academics from universities across the USA, with elements of rivalry that

could make the DARPA challenge the high-tech equivalent of the Oxford/Cambridge boat race. The difficulty of the task was clear: not only did every single vehicle fail the challenge, but the best recorded distance was a mere 7.4 miles, by Sandstorm from Carnegie Mellon University, and even that went off-course. One car even managed to flip itself upside down in the starting area.

Why was the driving more moribund than two hours of 'Top Gear' out-takes? Unlike

non-metallic objects than radar, so it's suited for working out which terrain is safe to drive across. For more long-range terrain analysis, the car used a standard video camera that could identify objects up to 80 metres away, and the car could combine inputs from both sensors. If the LIDAR found a patch of clear road, this pattern could be matched with input from the video camera. Six computers built around 1.6GHz Intel Pentium M processors running Linux were used to run all the software in the

## A common problem with the vehicles was incorrectly indentifying objects and terrain.

laboratory robots that only need to move short distances at slow speeds, the vehicles in the DARPA Grand Challenge must maintain a course using waypoints, constantly checking their environment for potential hazards, all while travelling at speed. Managing all three at once is a task that people can usually cope, but it's incredibly difficult for a robot. Driving requires the ability to make quick decisions, and plenty of computing power is needed for an autonomous vehicle to process the streams of data it receives from its sensors in real time. A common problem with the vehicles was incorrectly identifying objects and terrain, such as the system deciding that a small shadow in the road was actually a large boulder, and trying to avoid it.

The following year saw better results. The 2005 challenge was made slightly easier, with wider roads and less obstacles on the route. Out of the 23 entrants, five completed the course, with the best recorded time to complete the course being just under seven hours. The winning car was Stanley, which was developed at Stanford University. The car, a heavily modified Volkswagen Touareg, made use of two sets of sensors to guide it: within its immediate vicinity, it scanned the terrain using LIDAR sensors, which work on the same principle as radar, but use beams of light rather than sound. LIDAR is better at picking out

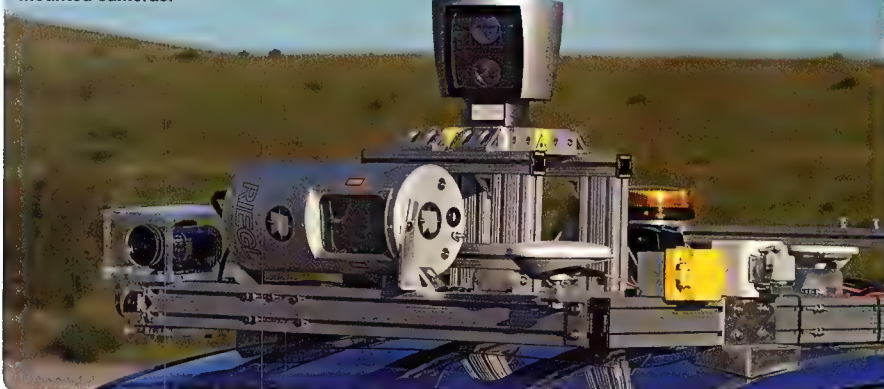
car, but other teams used entirely different computing setups. One vehicle used a set of Apple Mac Minis running Linux, another made use of an embedded Windows XP installation.

The success of Stanford University in 2005 wasn't the end of the DARPA Grand Challenge. If the aim is to build robotic vehicles that can navigate autonomously in real-world environments, they must be able to drive safely with other traffic on the roads. The most recent DARPA contest, held in 2007, raised the first prize to \$2 million, changed its name to the DARPA Urban Challenge and had vehicles driving around an air force base in California. As well as avoiding both competing robotic vehicles and cars driven by brave human volunteers, the teams had to ensure their vehicles adhered to all road laws.

This time, the prize was claimed by Dr. Red Whittaker's team from Carnegie Mellon, with Stanford pushed into second place. The race wasn't without its mishaps, though, as some cars sustained a few knocks and bumps along the way. Two of the cars had a minor collision during an overtaking manoeuvre, while another team's vehicle blindly drove into barriers. Although the race was completed, the problems show that autonomous vehicles aren't yet ready to be deployed on either the battlefield or busy roads.



The autonomous vehicles of the DARPA Grand Challenge use a sophisticated set of roof-mounted cameras.



## Google Lunar X Prize

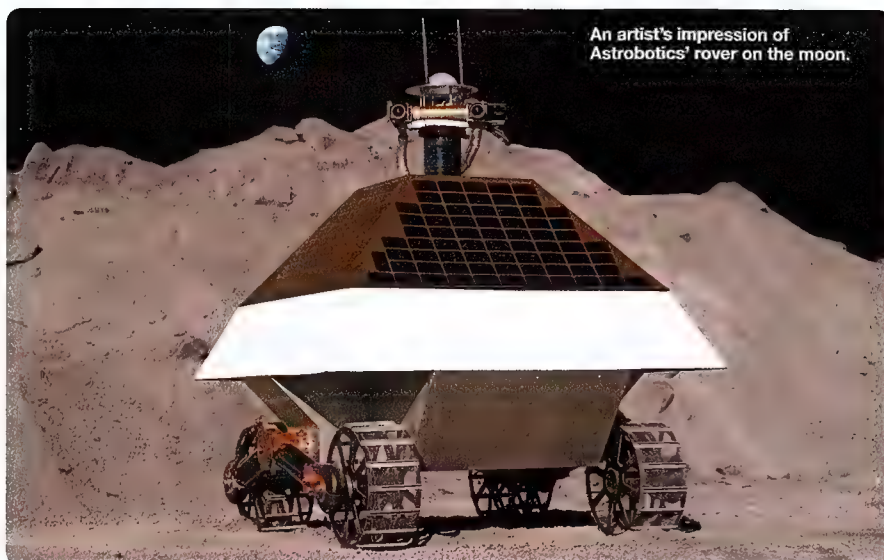
**Challenge:** To safely land a robot on the surface of the Moon, travel 500 metres over the lunar surface, and send images and data back to Earth. Teams must be at least 90 per cent privately funded and registered to compete by 31 December, 2010.

**Prize:** The first team to land on the Moon and complete the mission objectives will be awarded \$20 million; the full first prize is available until December 31, 2012. After that date, the first prize will drop to \$15 million. The second team to do so will be awarded \$5 million. Another \$5 million will be awarded in bonus prizes.

**Status:** Open.

The first X Prize aimed to kick-start commercial





An artist's impression of Astrobotics' rover on the moon.

space tourism and its follow-up has even loftier goals, as befits the fact it's backed by Google and offers a massive \$20 million bounty. All you have to do is land on the Moon with a robotic rover, drive around a bit and then transmit live high-definition video of the lunar landscape back to Earth. The vehicle must survive for two weeks on the Moon's surface and travel at least 500 metres, withstanding the harsh environment, wildly varying temperatures and direct exposure to solar radiation.

In addition to the main objective of reaching the lunar surface, much like a video game, the Google Lunar X Prize offers further cash amounts for teams to complete bonus challenges. If the rover can travel a distance greater than 5km, survive an entire lunar night (which in Earth's time is over two weeks in freezing darkness), photograph man-made artefacts leftover from the Apollo missions of the 1960s or discover ice, then the team receives an additional \$5,000,000.

It sounds tricky, but this hasn't been enough to deter a long list of teams from entering the competition. The first to sign up was Isle of Man-based Odyssey Moon ([www.odysseymoon.com](http://www.odysseymoon.com)), whose aim is to eventually establish the first business to take advantage of the Moon's resources. The team comprises a line-up of experienced individuals and organisations for its MoonOne design. This includes many ex-NASA senior executives and members of The Planetary Society, a group co-founded by pioneering astronomer Carl Sagan, and a Canadian corporation known as MacDonald, Dettwiler and Associates. It's hardly a household name but MDA has experience of designing sophisticated robotic components for previous space missions, including the International Space Station's robotic Dextre module and the 'Canadarm' for the US Space Shuttle.

Another team is approaching the contest with an entirely different philosophy. Team Frednet ([www.frednet.com](http://www.frednet.com)), led by Fred Bourgeois, aims to complete the challenge

using open-source technology and ideas, to which contributions have been made by enthusiasts from all around the world. Its aim is to apply the same principles behind open-source technologies such as Linux to the problems of space travel. Much of the development and sketching of ideas begins not in expensive corporate testing facilities, but in the backrooms, garages and gardens of amateur enthusiasts. People from a variety of different backgrounds, including students and experienced engineers, have contributed to the project via the website.

## THE NETFLIX PRIZE

A technology competition with a less scientific goal is being run by Netflix, the online movie rental store. The Netflix Prize offers \$1 million to an individual or team that can develop a software system that will recommend films its users will love, based on their ratings for previous films. To claim the prize, the system needs to manage a performance improvement of ten per cent over Cinematch, the system currently used by Netflix. Netflix hasn't divulged exactly what the system is to be used for, but websites such as Amazon use similar software when deciding which recommended products to display to shoppers.

Entrants are supplied with a set of training data, consisting of 100,000,000 separate ratings of over 18,000 movies, as provided by users of the Netflix site. The data contains all the individual ratings that were given, so the designer can build and test the accuracy of their program. Netflix then hands out qualifying data, where only half is provided with the ratings given by users. These must be predicted by the software, with the aim to have the smallest margin of error possible.

It sounds easy, but so far, the so-called 'Napoleon Dynamite' problem is causing the

Astrobotics Technology is a team that actively maintains an interest in pursuing the bonus goals set by the Google Lunar X Prize. The team is run by the same person responsible for winning the 2007 DARPA Urban Challenge, Dr Red Whittaker. Astrobotics aims to land within 2km of the Apollo 11 landing site, and send high-definition video footage of the location back to Earth. Afterwards, the team plans to switch its rover into hibernation mode to survive two weeks on the dark side of the Moon, in temperatures colder than liquid nitrogen.

Astrobotics also intends to run a commercial business on the Moon with further missions, exploring the surface and selling the data to any interested parties. A target launch date of May 2010 has been set for the initial mission to the Apollo 11 site, although whether Astrobotics will be ready by then remains to be seen.

Teams don't have time on their side in this competition though. To claim the prize, a team must land their rover on the Moon's surface no later than 31 December, 2014, and the rules state that the prize fund diminishes every year after 2012. It can be extended beyond these dates, but that will be up to the sponsors.

Most national space agencies, including NASA, are planning future missions to the Moon. Some of these missions will involve humans walking on the Moon, but not until at least 2020. If any team claims the Google Lunar X Prize then it's most probable that it will have beaten NASA to it, which is a triumph for the competitive spirit of the X Prize. (E)

entrants issues – that is, a film to which it's very hard to predict how people will react. While people who liked *The Matrix* will probably also like *Terminator 2*,

*Napoleon Dynamite* is a film that divides some groups of people and unites others – to the point that it frustrates those seeking the prize. On offer since 2006, it still hasn't been claimed. In previous years, Netflix has awarded a progress prize of \$50,000 to the entrant who manages the best performance improvement over the last year. The prize is being offered until at least 2011, but it's likely that it will have been claimed long before then. The current leading team, a group of engineers from AT&T, under the name Bellkor, has managed to achieve an improvement of 9.6 per cent, which is very close to the magic ten per cent figure required to win.

You can read more about the Netflix prize at [www.netflixprize.com](http://www.netflixprize.com).





## HARDWARE

## NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

We're constantly being sent the latest hardware here at Atomic, and this month is no slouch. We've got the very latest Phenom II processor, three brand-spankingly new 4890 graphics cards, the first mATX X58 motherboard in the country and a whole lot more on top.

Not only that, but we've taken the best budget motherboards and locked them together in deadly combat to find you the best choice for either Intel or AMD. Monitors, mice, keyboards and storage are also here, so no matter what hardware you're interested in we've got you covered – so get reading!

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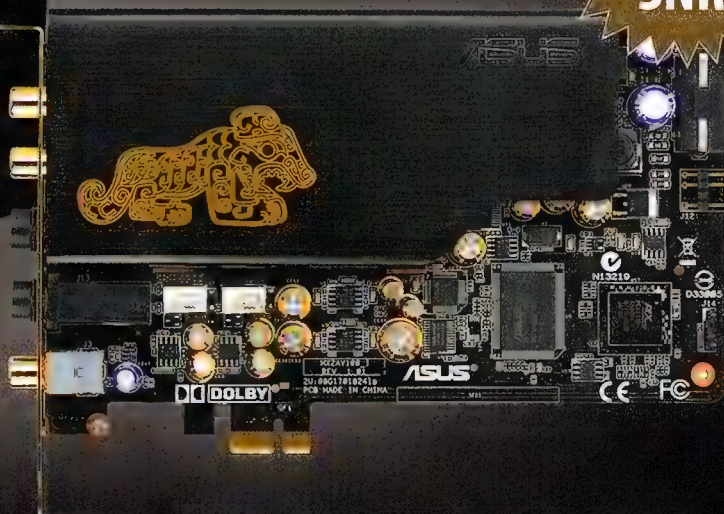
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# Hear the New Era in PC Hi-Fi Audio

Industry-leading Top SNR and Built-in Headphone Amplifier for Extraordinary Aural Enjoyment



**124dB  
SNR**



4000 years ago, ancient Chinese ancestors sought out the best materials to create instruments that played "heavenly" music in homage to the gods. This resulted in the Tiger Chime, which represented the highest level of audio enjoyment. The new ASUS Xonar Essence STX range of audio cards follows in this vein, and blends industry-leading features to serve up the ultimate in audio experiences. With ASUS' exclusive Hyper-grounding and EMI Shield design, as well as the capability to fully-drive headphones via a built-in amplifier, the Xonar Essence STX delivers an industry-leading 124dB SNR (Signal-to-Noise Ratio) for signal clarity, under 0.0003% of noise distortion; and proudly bears a gold-plated Tiger Chime totem on the EMI shield—symbolizing a mix of ancient and cutting-edge technologies.

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Allow yourself to be swept away by an astounding 124 dB SNR that reproduces truly pure sounds. 64 times clearer the most on-board audio solutions (85–88 SNR), the Xonar Essence STX also features the ASUS exclusive Hyper-grounding circuitry design that utilizes a unique PCB design to separate signal and noise—ensuring the cleanest signals for decoding.

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Wave goodbye to dull and bland sounds from headphones, as the Xonar Essence STX's built-in headphone amplifier can fully-drive every available headphone with up to 600 ohms of impedance to their full extent. High density sounds with less than 0.001% of distortion will thus be possible—all without additional amplification. Furthermore, the Xonar Essence STX also includes: Swappable OPamp sockets to help tune up unique sounds, complete Dolby Home Theater technologies, and the latest DS3D GX2.5 3D gaming engine technology to sate even the most demanding audiophile.

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# HOW WE TEST

**W**e do a lot of testing in our labs, and we look long and hard at every piece of hardware to determine whether or not it passes muster. From taking a new card out of its packaging, to bundled extras, to performance, every facet of a given piece of kit's 'user experience' is under scrutiny.

In some instances, we have tough benchmarks to help us rate gear. For a CPU or a graphics card, raw performance is of course the most vital stat as whether it stinks or smells like roses. But there are other things we pay attention to in the review process.

Value for money is an important consideration, especially during the current financial climate. High end gear is expensive enough as it is, so we also look for good bundles. For instance, a graphics card that comes with a game or two, all the cabling you'll need, and little surprises like tools and other bumpf will score higher than a card that costs similar, but doesn't give you any presents.

Build quality is another thing we rate. From a PC case to a motherboard, we like our hardware well made and capable of a taking a bit of punishment. We also like any included manuals to be clear and concise.

A lot of what we look for can be hard to put into numbers, we admit, but we try to think about what any enthusiast would think about their new gear after laying down money for it, installing it, and then using it.

And our benchmarks help, too. We've tried to pick a suite of games and applications that anyone can get access too, so that you – the reader – can easily compare your own gear with the kit we have in each issue. In fact, we'd recommend to all our readers that they run all of these tests on their systems and save the results, so you can always have a familiar benchmark of your own to compare to the latest gear in Atomic each issue.

## HOT AWARD WINNERS!

ISSUE 101

Just some of this month's HOT AWARDS...

### ASUS RAMPAGE II GENE

"ASUS has a definite winner with this miniaturised mobo..."

**91/100**

### XFX 4890 XXX

"... fundamentally different – and awesome..."

**90/100**

### PLANTRONICS GAMETRON

"... this is definitely worth it"

**91/100**

### MICROSOFT X8 MOUSE

"Why hasn't anyone else thought of this?!?"

**93/100**

### SCYTHE GENTLE TYPHOON

"... there's really nothing else we'd recommend."

**90/100**



Our gaming test rigs: NRG systems with Phenom 9850 CPU, 4GB of DDR2 RAM and a 4870X2 graphics card. The mainstay of our games testing.



## CPU Benchmarks:

### Hexus Pifast

<http://pifast.hexus.net/pifast.php>

PiFast is a program that essentially calculates pi to a set amount of decimal places. It is a single-threaded application (one core/thread) and we run it at ten million places (10, 000, 000) using the Chudnovsky method, in the standard mode with no compression, and a FFT length of 1024kb. The program is free, so feel free to run it on your CPU and compare. Memory bandwidth plays a significant role in the final performance of this program, so be sure you bump up the frequency as well as the CPU clock!

### wPrime

<http://www.wprime.net/>

"wPrime uses a recursive call of Newton's method for estimating functions", says the website as it attempts to explain in plain English what it does. What it does is, essentially, complex square rooting and other number functions, which are able to be split up evenly between multiple cores, or simply run on a single core. We use wPrime 32M in both single and multi-threaded. The results of the single run are divided by the results of the multi run, and this gives us the efficiency of the CPU being tested – very useful knowledge to have when comparing chips and evaluating the benefits of overclocking.

### Cinebench R10 x64

[http://www.maxon.net/pages/download/cinebench\\_e.html](http://www.maxon.net/pages/download/cinebench_e.html)

Cinebench is a stalwart benchmark, and is one of the more entertaining ones to watch. It focuses on rendering an image at 800 x 600 resolution, complete with ray-traced light effects and much more. This is able to be run in either singlethreaded or multithreaded mode, and efficiency is calculated exactly the same way as for wPrime. Simply download the .zip file, extract, and run! The program also supports up to 16 threads in total, and even eight threads with Nehalem is an impressive sight to see. The difference in performance between 32- and 64-bit is minimal – just keep that in mind if your results for the same setup are slightly different.

### Everest Ultimate Edition

<http://www.lavalys.com/>

Everest is a system information tool that monitors voltage, temperature, as well as reporting on a massive list of other areas of your system. Hardware and software are noted here, but perhaps the most useful part of this program is the memory benchmarks. Ready for the fastest of dual/tri-channel memory, this tests the read and write bandwidth as well as latency. The program is a small download, but keep in mind that you only get a thirty day trial until you purchase the full version – something recommended if you're into getting the most info about what your tech is up to.

## GPU Benchmarks:

### Crysis

<http://www.ea.com/crysis/>

When Crysis was released, it was the beast that literally broke many so-called hardcore rigs, reducing the owners to tears. Even now, more than a year after the game's release, this game is still exceptionally graphically challenging. As such, it's the perfect choice for our testing, and something that you can test, too, if you've got a copy – just set all the settings to Very High, with no AA/AF, DirectX 10 and a resolution of 1,280 x 1,024 – and go for your life! Results are recorded as the last result of the final benchmark passthrough, to give the fairest comparison.

### Race Driver: GRID

<http://www.racedrivergrid.com/>

GRID, as some racing aficionados will know, is one of the most fun games of its genre to come about for quite some time, giving an accurate damage model along with realistic handling and a great visual style. Not only that but it is also very scalable over multiple GPUs, and is also capable of running on lower-end gear. We chuck all the settings to High, with 8xMSAA, at 1920x1200 for this test, using FRAPS to monitor the frames per second as we tear around the track for a single lap in our car of choice – the Nissan 350Z.

### 3DMark 2006

<http://www.futuremark.com/benchmarks/3dmark06/introduction/>

Designed as a benchmark for DirectX9 based systems, 3DMark 2006 (or 3DMark06) has been a staple of the enthusiast diet for many years. With four graphical tests, and two CPU tests, these combine to give a final overall score that allows direct numerical comparison to any other system in the world and, best of all, it's completely free. Just head to the URL above, and download your copy to compare to any of the reviews in the mag. All of the tests are run at stock settings, so just install, run, and compare – it couldn't be easier!

### 3DMark Vantage (2008)

<http://www.futuremark.com/3dmarkvantage/>

As the first extremely convenient benchmark program around for DirectX 10, 3DMark Vantage is a new contender in the benching scene – and is proving very popular. While you can download and run it for free, this is only once, requiring a small fee to register your copy (though the bragging rights for showing off your rig may be worth it). Some graphics cards will even give you a copy! We run this at stock settings, which is the most appropriate for comparison between our results and yours. This is also significantly better at multi-gpu performance scaling efficiency.



# Phenom II 955 Black Edition

Once you go Black...

Street Price US\$265 Supplier AMD

Website [www.amd.com](http://www.amd.com)

Specifications 3.2GHz quad core; 45nm manufacturing process; 4x512KB L2 cache; 6MB L3 cache; 16x unlocked multiplier; 125W TDP

**A**MD's series of Phenom II processors have been some of the most interesting – and finicky – processors of the past few years. With what is essentially a very tweaked K8 architecture, there don't seem to be many changes on the surface; it's only when you delve below that you begin to see the difference. So, when AMD brought us this chip, we figured we'd go into it just a little closer.

## (Cross)Fire breathing dragon

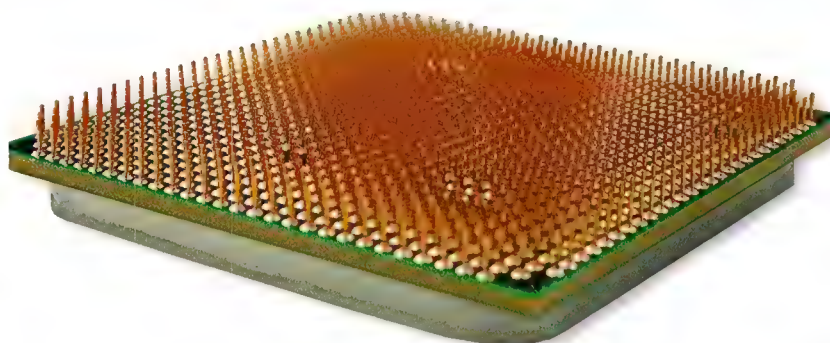
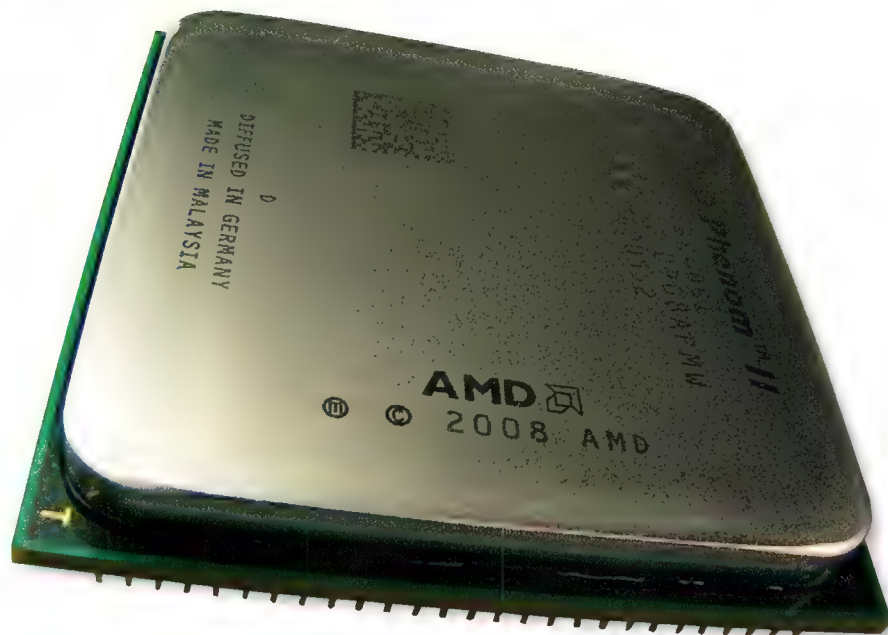
The original Phenom brought not much new to the scene – it was limited to DDR2 and was compatible with the same motherboards that were already on the market. Separating itself, the Phenom II supports an entire new platform, based on DDR3 memory instead. Thanks to a complete redesign of the core architecture, the memory controller has been updated for this new standard. The good news is that it's retained DDR2 compatibility, so no matter what memory you've got at hand you're covered.

This chip was intended to fit in with every other product AMD produces, like its 7-series chipsets, 4-series graphics cards (they'd love it if you bought a few of these for CrossFire), and overclocking software. Not only is it intended to play nicely with those, but it's also a whiz at overclocking at subzero temps, though unfortunately doesn't do quite so well on air.

## Tweaking the Core

There were quite a few enhancements applied to the original Phenom core, and to leave it unmodified would simply unjustify the II moniker. The most important one is AMD's tweaked Smart Fetch technology, which is essentially how the three levels of cache interact with each other. Each core on the quad-core Phenom II has exclusive access to their own pools of L1 cache (at 64kb data, and 64kb instructions), as well as L2 cache (512kb). There's a giant collective pool in the centre of the chip that is comparatively mammoth, running 6MB of cache.

The differences here are that each progressive level runs slower than the preceding levels, meaning that the largest cache is also the slowest. This is minimised by the Smart Fetch tech, which is essentially a process where

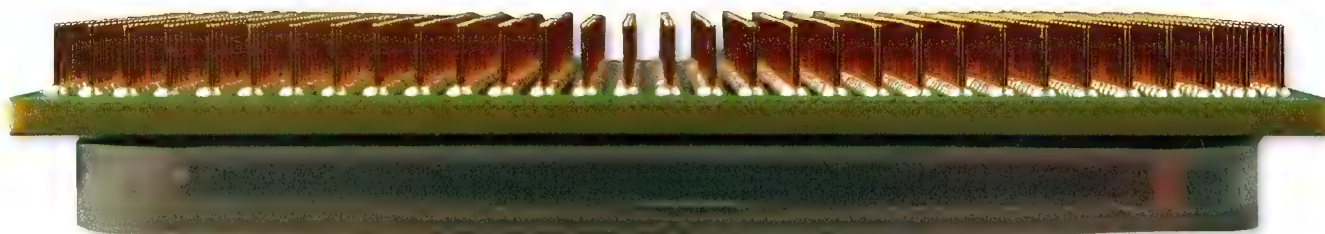


Phenom II 955 Black edition

14955	200x13; DDR3-1333 7-7-21	217x13; DDR3-1446 7-7-21	230x13; DDR3-1532 7-7-21
PiFast	33.77s	31.28s	29.52s
wPrime 32M – single thread	44.351s	41.044s	39.047s
wPrime 32M – multi-thread	11.731s (3.70x efficiency)	10.686s (3.93x)	10.047s (3.91x)
CineBench R10 64-bit – single thread	2913	3151	3345
CineBench R10 64-bit – multi-thread	10438 (3.58x efficiency)	11343 (3.60x)	12016 (3.59x)
Everest Read	8432MB/s	9130MB/s	9484MB/s
Everest Write	6772MB/s	7329MB/s	7769MB/s
Everest Latency	51.3ns	47.4ns	45.7ns







the data kept in the L1 and L2 caches are mirrored on the L3 cache – in case of a core halt (otherwise known as an execution error) the data is already waiting to be replicated. Smart Fetch isn't just a mirror however and constantly monitors what data should be kept in the cache, as well as what data might be needed in the future. All these add up to some decent performance gains, as well as reliability.

## Micromanaged microarchitecture

The Phenom was a breakthrough chip when first released, being the first true Quad-core CPU to include four cores on the one die. The downsides to this were noticed significantly at launch before the manufacturing process was

brings something new to the table however; new CoolCore technology means that the L3 cache can also be shut down when not in use. Considering that this part of the die is the same amount in terms of real estate as the cores themselves, this is a great innovation that should save a little extra power.

## AM3, easy as 123

Moving to an entirely new socket involves costly testing, design and a lot more testing. Not wanting to head down this route, the Phenom II runs on the AM3 socket – physically identical to the AM2+ socket we use today but with two slots missing. The original AM2+ has 940 pins, while the 938 pins of the AM3 enable something different – they stop the AM2+ chips being used on AM3 (there is no way to get the CPU in the

actual benefits to moving to Phenom II over the original, keeping in mind we've established a clear lead over the Athlon 64 chips?

## Phenomenally lacklustre performance

We'll start the performance part off by mentioning that this CPU starts at a clock speed of 3.2GHz, which is substantially higher than the original Phenom's limit of 2.6GHz stock. Keeping in mind that AMD has claimed it to be a real alternative to Nehalem, what we found was decidedly disappointing.

Stock performance was pretty good, but compared to Nehalem it pales – and compared to a Q8200 ([www.atomicmpc.com.au/?129237](http://www.atomicmpc.com.au/?129237)) the story is even worse. It's got decent latency on the memory (thanks in large part to the DDR3), but the read and write speeds were actually lower than the Q8200! Not only that, but it's also outstripped by far in the overclocking avenues as the highest clockspeed we could squeeze out of this chip on air was 3895MHz. The chip also hit a point where it refused to accept any more voltage for stability, and even did the opposite – refusing to boot and chucking a fit whenever we mentioned anything to it.

## Wrapping Up

All in all the Phenom II 955 Black Edition chip is a nice option if you've \$US265 to spend, but if you're anything like us we'd be saving up for a new Nehalem rig – the difference is worth the wait. **JR**

## You don't have to buy an entirely new mobo to get the benefits of Phenom II; instead you simply have to buy the new chip.

tweaked well enough for high yields, and if a single core is damaged on the die then the entire chip will be faulty (though the triple-cored CPUs can sometimes work if the faulty core is disabled with a laser).

Thanks to their smart design, individual cores can lower their clockspeeds and core voltage when at idle to save power. The Phenom II

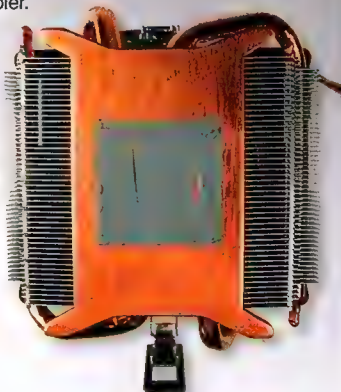
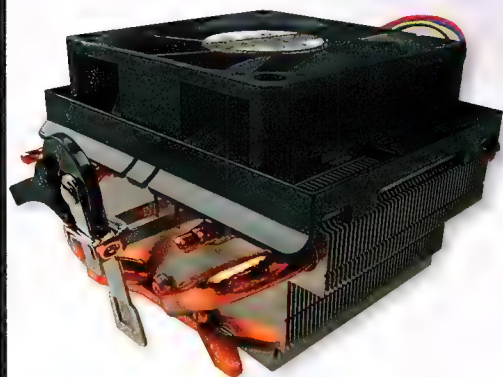
socket, unless you're incredibly disgruntled and have an uncontrollable hammer affliction), while still letting the AM3 chips be used in AM2+.

This means that you don't have to buy an entirely new mobo to get the benefits of Phenom II; instead you simply have to buy the new chip and chuck it in your old AM2+ motherboard (after a quick BIOS flash). But are there any

### Updated stock heatsink!

We also got a new stock heatsink with this chip, and found that we could only push it to 3440MHz before it'd become unstable. At stock it ran idle temps of 39 degrees

with 66.4dBA, and load was 56 degrees at 75.1dBA – definitely get yourself an aftermarket cooler over this annoyingly loud cooler.





# ASRock X58 SuperComputer

Dare we expect super performance?

Street Price \$445 Supplier Altech  
Website [www.asrock.com](http://www.asrock.com)

Specifications Socket LGA1366; Intel X58 chipset;  
ATX form factor; 4x PCIe x16; 3x PCI; 1x EIDE; 6x SATA;  
DDR3-2133

Gallery Link [www.atomicmpc.com.au/?139004](http://www.atomicmpc.com.au/?139004)

Everybody has a burning need within them (figurative, of course) for a motherboard that does absolutely everything they could want, and then a few extra things on top that they'll never use (but are always nice to have around). This motherboard from ASRock claims to be just that, even going so far as to claim some kind of SuperComputer label (just like an Evil Genius would use in this old-school review [www.atomicmpc.com.au/?22606](http://www.atomicmpc.com.au/?22606)).

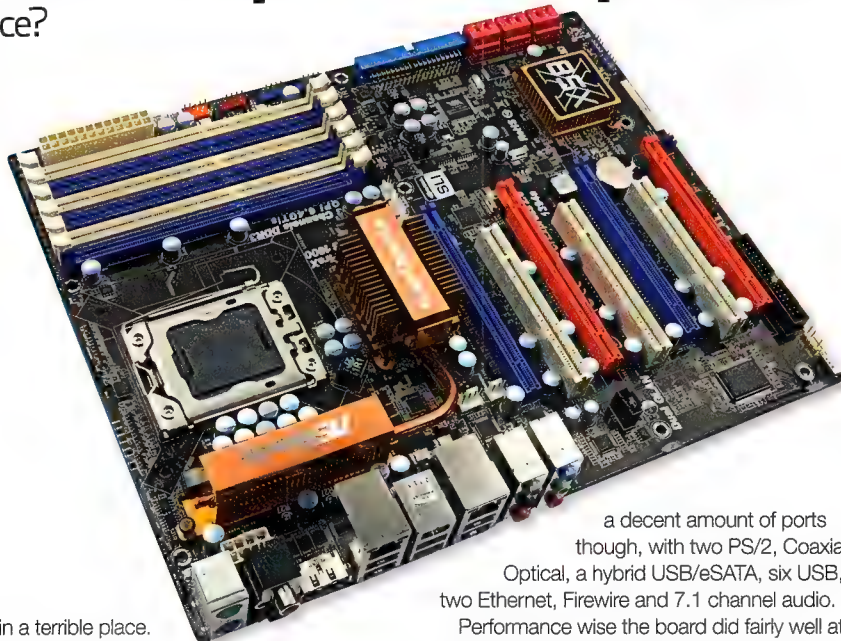
Technical specs certainly seem to fulfil this, as the ever-popular enthusiast X58 chipset has been whacked into the middle of the board. This is a 65nm chip that still pumps out a decent amount of heat even though the memory controller has been relocated to the CPU, so cooling is still required. This is provided in the form of a small golden heatsink that is actually just anodised aluminium with a copper heatpipe in the bottom, joining it to the power regulation that also features a heatsink. Solid caps and ferrite chokes are used here as is the norm for high-end mobos, though the chokes are decidedly smaller than what we'd normally see used – this didn't affect stock performance but did rather hinder overclocking.

The good news is that there's enough space around the LGA1366 socket to fit most large CPU coolers, though the 4-pin fan connector is in an odd spot behind the heatpipe for the cooling array. There are the usual six DDR3 slots, each colour coded to show the dual-channel support. The white slots need to be filled first for best performance, apparently. 24-pin power is in a surprisingly good location at the very top-right of the board, but the 8-pin CPU power

is in a terrible place. Residing right next to the I/O ports, it's surrounded on all sides by capacitors and components, causing clearance problems for our power supply. A little creative (and gentle) capacitor bending allowed that PSU to be used, but it's pretty silly either way.

Another odd choice was to move the front panel headers to the top-right edge of the board, making cables run upwards instead of down. This wouldn't be so much of an issue except for the absence of onboard power switches, meaning that overclocking will need to be done in a case or with a screwdriver. Right-angle IDE and SATA ports take up the bottom-right of the board as normal.

The bottom edge has only floppy, serial and SPDIF headers, though thankfully a clear CMOS header is here. The audio header is placed just behind the I/O ports, and all five fan headers are in the middle of the mobo around the chipset – this will make for terrible cabling. There are



a decent amount of ports though, with two PS/2, Coaxial/Optical, a hybrid USB/eSATA, six USB, two Ethernet, Firewire and 7.1 channel audio.

Performance wise the board did fairly well at our first two speeds, but remained thoroughly unable to reach our third basic preset. The BIOS layout was awkward and unintuitive, hiding the overclocking options underneath the chipset settings. Vdroop was a huge issue too – we set 1.575V in the BIOS to get 1.480V in reality – almost an entire .1V lost!

Bucking the usual entry point of the Del key, this mobo uses F2 for some unknown reason and makes overclocking a pain in the butt. The cooling array is also terrible, getting hot enough to toast an entire loaf of bread from across the room and introducing instabilities when we attempted to push further – Cinebench multithreaded simply would not complete.

Sure it has four PCIe x16 slots but the orange ones are only 8x electrical, and all these add up to a board that is thoroughly underwhelming. **JR**

## ASRock X58 SuperComputer

	#965 133x24; DDR3-1600 8-8-8-24; 3.2GHz	150x24; DDR3 1500 8-8-8-24; 3.6GHz	160x24; DDR3-1604 8-8-8-24; 3.84GHz
PIFast	26.42s	23.63s	23.75s
wPrime 32M – single thread	41.125s	36.375s	35.311s
wPrime 32M – multi-thread	7.985s (5.15x efficiency)	7.141s (5.09x)	6.800s (5.19x)
CineBench R10 64-bit – single thread	4707	5187	5497
CineBench R10 64-bit – multi-thread	18643 (3.96x efficiency)	20873 (4.02x)	WNC
Everest Read	17426MB/s	16432MB/s	12837MB/s
Everest Write	13967MB/s	13585MB/s	14247MB/s
Everest Latency	31.6ns	33.0ns	36.4ns

**Performance**  
Does okay at stock, bad OC'ing.

74

**Value**  
Not too expensive for the options.

86

**Features**  
Toast, anyone?

75

**Build**  
Gets a little warm in places, but reliable.

55

**Overall**  
A disappointingly underpowered, thoroughly normal computer.

71%



# What

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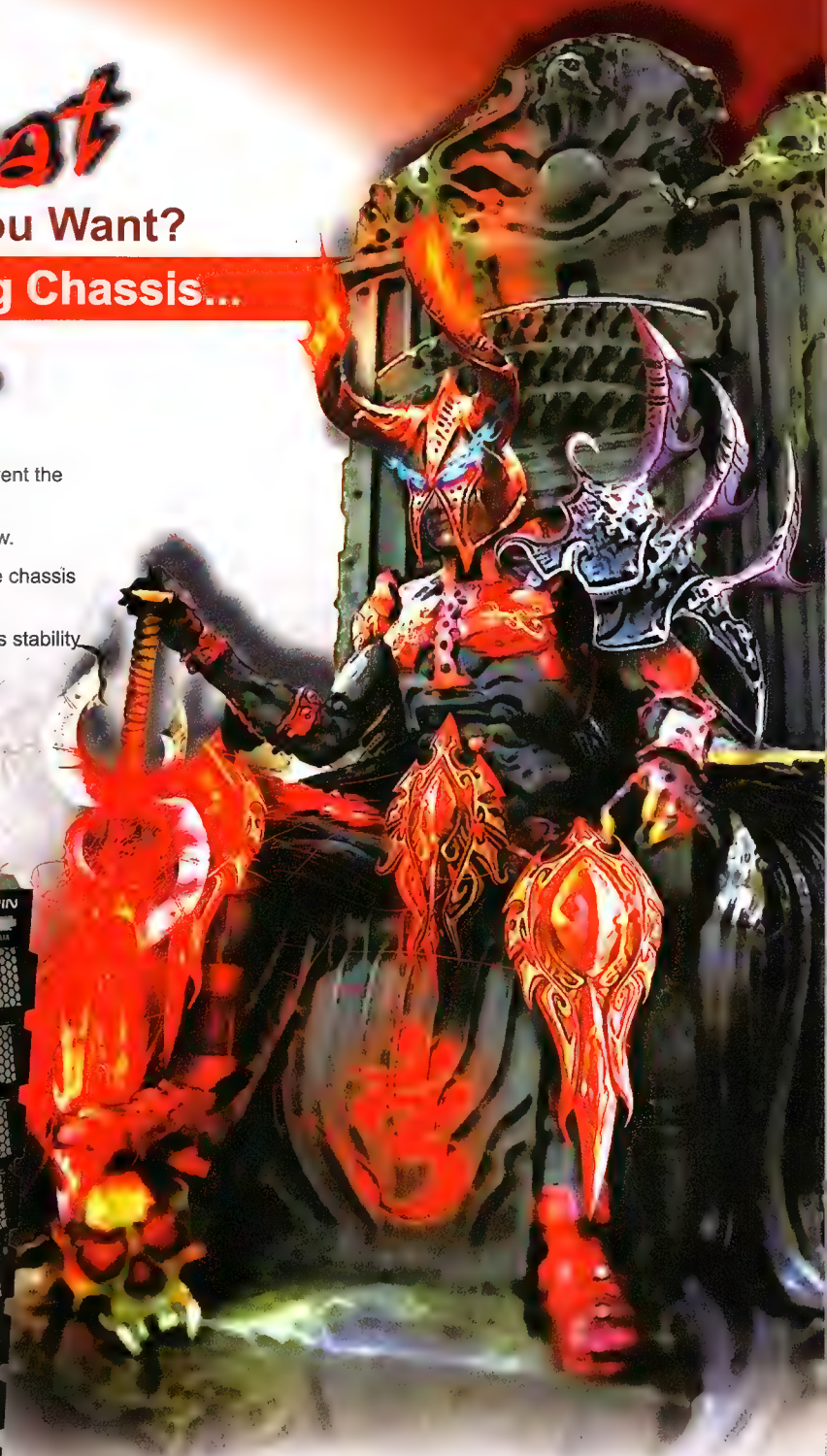
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# ASUS Rampage II Gene

It's not the size of the board...

Street Price \$490 Supplier Asus

Website [www.asus.com.au](http://www.asus.com.au)

**Specifications** Socket LGA1366; Intel X58 chipset; ATX form factor; 2x PCIe x16; 1x PCI; 1x PCIe x4; 6x SATA; 1x EIDE; DDR3-2133

Gallery Link [www.atomicmpc.com.au/?139582](http://www.atomicmpc.com.au/?139582)

Good excuses to use silly clichés aside, ASUS has long been useful for another purpose. Namely the company's been consistently good at making motherboards with features you don't really see anywhere else, and it usually gets its boards out first. The mobo we're looking at is the Rampage II Gene, and if this board were a person it'd be missing more than a few chromosomes when compared to a full-sized model. In reality, however, this pint-sized rampant scamp packs in all the features we love about X58 into a much smaller size.

Being the X58-chipsetted wonder we know and love grants this mobo the capabilities for Crossfire and SLI, both more than capable of running on this board's two full-length PCIe slots. There's also a PCI slot for wireless! Nestled underneath the black and red aluminium heatsink is where we find this chipset, and it is connected to the power regulation via a nickel-plated heatpipe. The logo isn't lit up on the chipset (thankfully), but there are indicator LEDs around the chipset, CPU and memory to show theoretical load.

The CPU socket is a great piece of work, with a decent amount of space around it for coolers and capacity for both LGA1366 and LGA775 heatsinks to be used – very handy for a smaller build. A full complement of DDR3 slots are handy for a huge amount of memory (up to 12GB), though keep clearance in mind for sticks sporting tall heatsinks.

The BIOS battery is upended and stands tall at the top-right of the board, while the 24-pin and 8-pin power connectors are in the best



placement possible. Right next to the 8-pin (top-left) is a header for the included LCD post screen. IDE is included next to the DDR3 slots, and a series of six right-angled SATA ports along the edge of the board – one extra vertical port is also there. Front panel connectors are standard, along with USB headers, Firewire and audio all along the bottom.

A large power button labelled 'Start', with another smaller reset button next to it are handy, while a hardware MemOK button makes sure the memory is functioning correctly. The small silver plate at the bottom-left of the board says X-Fi on it proudly (though as our gallery link above shows this is actually just a standard onboard chip). Not that you'll ever need to use it, but there is a quick-swap BIOS at the bottom of the board; leave this alone unless you know what you're doing, though.

Five fan headers are dotted around the edges of the board, and are phenomenally useful for keeping the board cool – we recorded incredibly toasty temps on the Northbridge of 66 degrees

Celsius, and a whopping 80 degrees on the Southbridge. The BIOS seems to want to slow things down when temps get to 100, but we definitely don't suggest leaving these 24/7 without airflow.

I/O options are great for such a small mobo too, with six USB, a single PS/2, Firewire, eSATA, Ethernet, 7.1 channel audio, Optical and a Clear CMOS button. All these features being crammed into a small board is impressive, but we wanted to know just how far it'd overclock. The answer is – pretty well. We managed to get it to our third level preset, but the heat on the NB/SB was too great to get past 160 QPI. This isn't a bad result though – considering it's such a small board, that it can overclock at all is still quite impressive.

ASUS has a definite winner with this miniaturised mobo, and we've used it to great effect in this very mag (check out the Tutorials section for more) – good work ASUS! **JR**

## ASUS Rampage II Gene

	<b>965</b> 133x24; DDR3-1600 8-8-8-24; 3.2GHz	<b>150</b> 150x24; DDR3 1500 8-8-8-24; 3.6GHz	<b>160</b> 160x24; DDR3-1604 8-8-8-24; 3.84GHz
PiFast	26.27s	23.53s	21.29s
wPrime 32M – single thread	35.709s	31.668s	34.091s
wPrime 32M – multi-thread	7.363s (4.85x efficiency)	6.584s (4.81x)	6.645s (5.13x)
CineBench R10 64-bit – single thread	4709	5223	5686
CineBench R10 64-bit – multi-thread	19125 (4.06x efficiency)	20993 (4.02x)	21578 (3.80x)
Everest Read	17883MB/s	16824MB/s	17588MB/s
Everest Write	14579MB/s	13978MB/s	14824MB/s
Everest Latency	31.2ns	32.9ns	31.4ns

### Performance

Not the best overclocker, but nice.

83

### Value

For such a handy size this is nice.

94

### Features

Almost everything you could ask for.

96

### Build

Gets rather toasty at times.

82

### Overall

A sure-fire winner for the svelte mobo scene.

91%

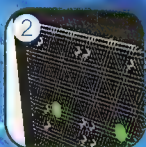


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# Galaxy GTX275

Warning: card may need to be strapped down to avoid takeoff.

Street Price \$439 Supplier Galaxy  
Website [www.galaxytech.com](http://www.galaxytech.com)

Specifications: 648MHz core; 1200MHz memory (2400 effective); GT200 core; 240 stream processors; 896MB GDDR3; 448-bit memory interface; triple slot PCB with active cooling; 8-pin and 6-pin PCIe power connectors

Card info [www.techpowerup.com/gpuz/6xk56/](http://www.techpowerup.com/gpuz/6xk56/)  
Gallery link [www.atomicmpc.com.au/?141839](http://www.atomicmpc.com.au/?141839)

In the animal kingdom, bigger is almost certainly going to mean better – huge teeth and muscular bulk are pretty good traits to have. When you apply the same to graphics cards, does it really increase performance, or are we simply tacking on gargantuan cooling solutions that aren't needed? Well, the answer is more or less obvious.

The Galaxy GTX275 is based around NVIDIA's GT200 core, running at a slightly enhanced 650MHz on the core (a paltry 17MHz increase) and 1200MHz for the 896MB of GDDR3 (up from 1134MHz). It's got a 448-bit memory bus to connect the core to the memory, giving a relatively wide pipeline to channel memory down, with plenty of space available to fit large game textures.

Physically the card is impressively sized – coming in as a triple-slot insane-length cooler this is not a small card in any way. Stretching about 10.5 inches from end-to-end this rivals the length we've seen from 8800GTX Ultra cards a couple of years back. Most of the bulk is taken up by the cooler – a huge heatsink provided by Arctic Cooling. This is their Accelero XTREME, and with a name like that it's got to be able to perform well to get our approval.

## GTX275 Comes Alive


The GT200 chip used in this is the same as what you'd find in a GTX295 – literally a single core. It has the same stream processors as a GTX280/5, but the memory interface of a GTX260, giving it better performance without overtaking the top-end. It's still based on 55nm tech.

## Galaxy GTX275 3d Mark scores



## Galaxy GTX275 Crysis Benchmarks



20% OC 


Consisting of a large base, the heatsink contacts the core and immediately raises outwards into a series of aluminium fins, relying on normal convection to move heat around. A series of five heatpipes run the entire length of the card; these dip down in the centre to meet with the base and carry heat to the further two aluminium heatsinks at either end. Each component on the PCB has a heatsink too, and all this adds up to a very significant amount of surface area for the heat to be dissipated.

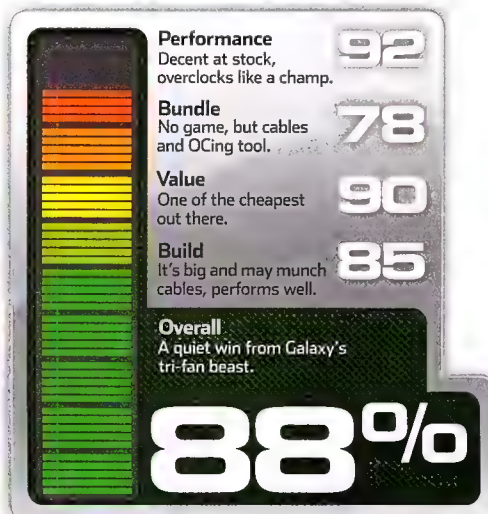
On top of all the fins are three identical 92mm fans, that make a combined noise of 53.6dBA no matter what load the card is under – this is one seriously quiet card, and we couldn't discern it from the rest of the test-rig! The fans are powered by the PCB itself, but also have an extra three-pin fan cable that seems almost useless (check the gallery link in the specs box for more). Idle temps were a chilly 39 degrees Celsius, while load was only 54 degrees, which is great performance for any cooler.

Not only does it cool well, but it gives a huge amount of overclocking potential too. We hit a core speed of 778MHz completely stable – a whopping

20 per cent increase! Memory performed quite well too, hitting a max of 1368MHz, proving this card as a great overclocker.

For what is essentially half a GTX295 (see the boxout), the performance of the card was quite good. It provides a perfectly playable Crysis, a smooth 3DMark06/Vantage and remains quiet throughout use. The only thing that is really missing with this card, apart from a size reduction, is the bundle; there was no game included. All the cables you'd want are there though, as well as a copy of Galaxy's Xtreme Tuner software, which is decent enough to overclock with (though we'd recommend Rivatuner instead).

For a card cooled well, with huge overclocking headroom and a price only about forty dollars over the absolute lowest price for any GTX275 online this is an excellent choice, and you won't be left wanting for much.  JR





# Manli GTS250

Bereft of goofy robots...

**Street Price** \$255 **Supplier** Bluechip Infotech

**Website** [www.bluechipit.com.au](http://www.bluechipit.com.au)

**Specifications** 740MHz core; 1100MHz (2200MHz effective) memory; 1836MHz shader; G92 core; 128 stream processors; 512MB GDDR3; 256-bit memory interface; dual-slot active cooler; one eight-pin power connector

**Card info** [www.techpowerup.com/gpuz/4hqxp](http://www.techpowerup.com/gpuz/4hqxp)

**M**anli were first introduced to us last month, with its budget-esque offering in the form of the 9600OC. Now Manli's given us its iteration of the GTS250 card – can the new kid fix some of the bugbears we had before?

Before we get distracted and think too much about bear/bug hybrids (with a coating of fur on their tough exoskeleton shell), let's talk about what's really important – the tech inside. Buried beneath the skin of this card is a heart of silicon, specifically the same G92 core we've been looking at since Issue 84. Sure it's been shrunk down from 65nm to 55nm, but not every GTS250 card is running the newer chip – this one and many others are still running the older 65nm version.

Still, with 128 stream processors and a 256-bit memory bus coupled to 512MB of GDDR3, it's got a little grunt behind it. There isn't anything different about the clockspeeds of this card – they're sitting at reference speeds of 740MHz core, and 1100MHz memory. This is an interesting decision because not only is the card capable of running faster, Manli has also chosen an aftermarket heatsink for it. We'd have thought this to be a great candidate for at least a small increase; it's certainly something to consider for the future.

We mentioned in Issue 100 that the PCB for the GTS250 was redesigned to be smaller and sleeker, but that the 512MB version was the same old clunky one – and this is the same old clunky one. It's about ten and a bit inches long, with a large cooler running the entire length. A dual-slot plastic shroud covers up a large machined block of aluminium, formed into fins and simply

attached to the core and memory chips.

At a guess we'd say it was manufactured by Arctic Cooling, but the lack of any stickerage means it's just that – a guess. As guesses go though it performs very well, keeping the card at 47 degrees Celsius idle with 59.5dBA, and a load of 67.9dBA at 61 degrees. The fan makes a strange whirring noise at load, with the bearings seemingly vibrating inside the chassis itself. Thankfully it's got a 4-pin PWM cable, so you can control the speed yourself through software.

We clocked it up to an impressive core clock of 815MHz (75MHz increase), with a final memory speed of 1124MHz (a boring 24MHz increase). This is more clockspeed than the Galaxy card we looked at by 4Mhz, but is behind on the memory speed by a whopping 232MHz. Better memory chips would help with this, but in terms of performance increase you'll see more from the core increases than the memory.

Drifting back to those bugbears, the front of the card and the packaging are eerily clear of any robots, gizmos or gadgets. The packaging is even superbly styled, and is something we

haven't seen before – it exudes quality from every pore. This is a good move, and certainly helps when releasing that fresh tech smell that we all secretly enjoy.

Twin SLI nipples are available, as well as two DVI ports. Most GTS250 cards will use a 6-pin power connector, but for reasons beyond us this card uses an 8-pin instead. Manli includes a dual 6-pin to 8-pin adaptor, and also include two dual-molex to 6-pins. Essentially meaning that you'll need four molex cables plugged into two adaptors, two adaptors into one, and that into the card – and it doesn't even need an 8-pin connector!

Still, performance is decent across the board, and is what we can expect from this core. No game is included, which gives us a sad face, but all the cables you could want/need are there.

 JR

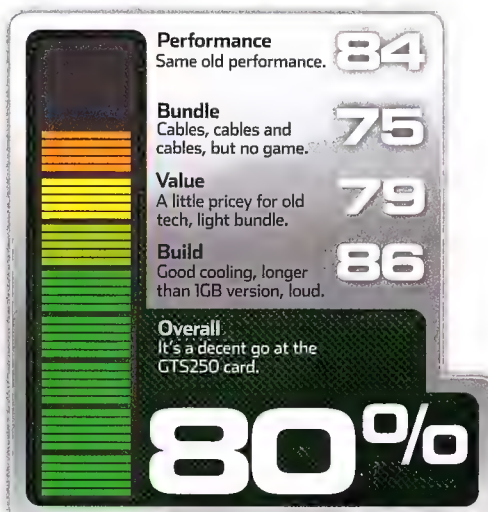
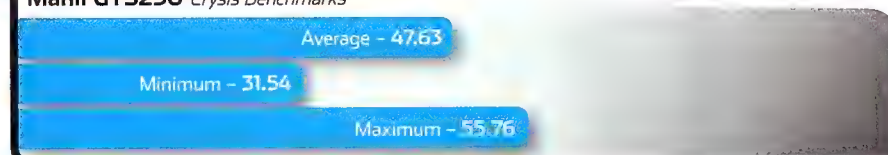


## Manli GTS250 3d Mark scores



Score

## Manli GTS250 Crysis Benchmarks





# ASUS EAH4890

We smuggled two of ASUS' best into the Labs...

Street Price \$520 Supplier ASUS

Website [www.asus.com.au](http://www.asus.com.au)

**Specifications** 850MHz core; 975MHz memory (3900 effective); RV790XT core; 800 shader units; 1GBMB GDDR5; 256-bit memory interface; dual slot PCB with active cooling; dual 6-pin PCIe power connector

**Card info (single)** [www.techpowerup.com/gpuz/v5nqe/](http://www.techpowerup.com/gpuz/v5nqe/)

**Card info (cf)** [www.techpowerup.com/gpuz/vu742/](http://www.techpowerup.com/gpuz/vu742/)



There have been many casualties on both sides during the epic struggle for supremacy between ATI and NVIDIA, with each team sending metaphorical nukes towards the other to gain a foothold. Performance is king, and the easiest way to do this is with a whole new core – but the 4890 isn't entirely new at all. Is it enough to make a difference, and tip the scales back in ATI's favour?

## The RV790XT core changes

The previous flagship single-core card from ATI was the 4870, and that was based around the RV770. As a graphics chip it was everything we could really ask for; a small die size for affordability and lower heat, and decent overclocking potential for extra gain. It had 956 million transistors, a core clock of 750MHz, and

800 shader units.

ATI has taken this existing design, and based its new card around it – the RV790XT. This core has the same amount of shader units, the same 55nm manufacturing process and runs with the same 256-bit memory bus, so what is different? The answer, of course, is in the clocks.

One of the main benefits of a mature manufacturing process in silicon chips (for example the Intel Core 2 CPU line) is that you're eventually

left with a very high percentage of reliable, well-performing chips. ATI's had a lot of time to perfect the process by now, and this shows in the extra 100MHz core clock, and 75MHz memory clock that ATI have added to the card.

This speed increase gives a huge bump in theoretical memory bandwidth (adding 1.6 GigaPixels per second), as well as compute performance of 1.36 Teraflops. That's 1012 Floating point Operations Per Second, which is incredible. How did they get this huge increase – voodoo?

## When the chips are down

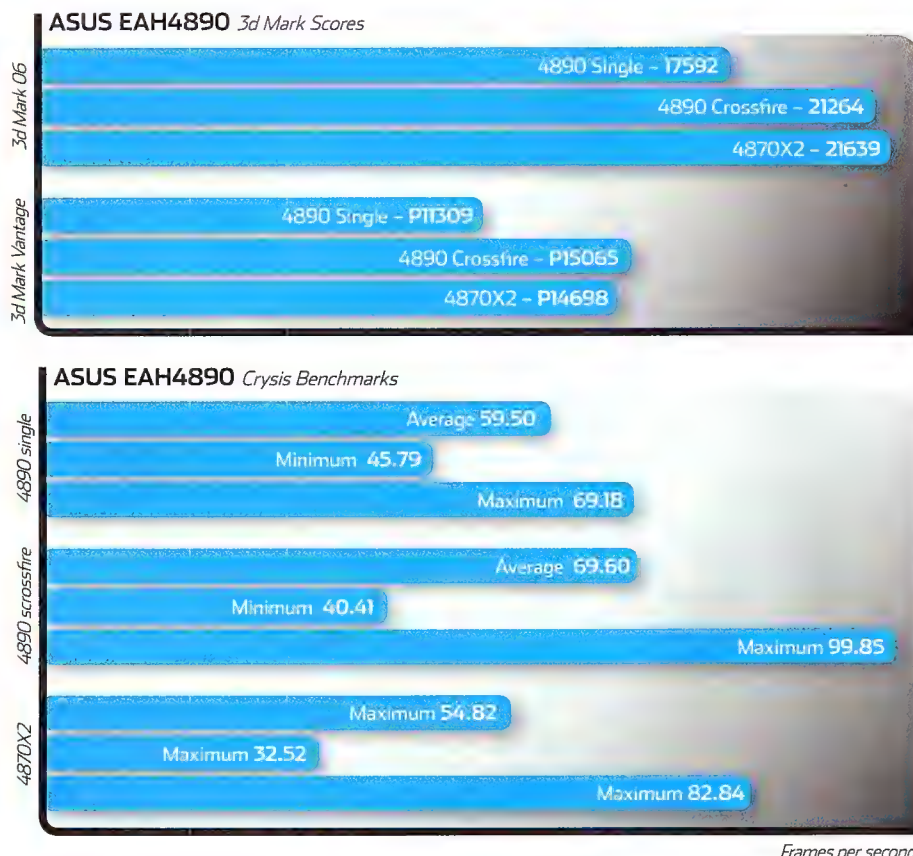
The RV770 as it was couldn't withstand this increase in clockspeed, even if it was a damn near perfect batch of cherry-picked chips for every run (which means that costs would be through the very literal roof). Instead, the RV790XT has a secret – an extra three million transistors.

Along with an increase in total to 959 million transistors, the upgraded core also packs in some very essential features, which surround the entire core. We're being literal – the edges of the chip are where these extra transistors reside. But what do they actually do?

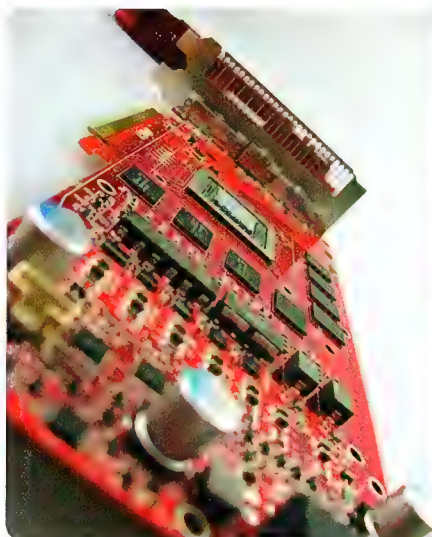
Called the Decap ring, these three million transistors act as miniature decoupling capacitors, also known as decaps. Their purpose is to reduce signal noise, monitor the power distribution (which manages heat output), and manage the timing of the entire chip. Through monitoring of the core timing, this means that higher clocks can be increasingly stable; not only that but they can increase them at stock too – granting the 100MHz core increase mentioned earlier.

## ASUS 4890

While knowing what's inside a card is nice, now it's time to find out what it looks like – and how it performs. We grabbed a 4890 from ASUS, and whacked it down to find out just what makes it tick. Physically the card is similar to the 4870







design, with a large red shroud covering the cooling array underneath. There is a large squirrel-cage fan (a very powerful one amp version) at the end, bringing in cool air that is passed through the aluminium fins of the heatsink. A large copper base and three very thick heatpipes move the heat away from the core, managing to keep the card at 52 degrees idle, and only 63 load. It made 59.2dBA at idle, and a rather loud 72.5dBA under stress.

Two PCIe 6-pin power connectors feed the card (which is rated at a TDP of 190W), as well as the standard two Crossfire nipples, two DVI ports and analogue video out. The cooler runs with a 4-pin PWM cable, so is controllable via software. ASUS has its latest sticker design on here too – a horseman with lightning and fire.

It's clocked at reference speeds of 850MHz core, 975MHz memory, but even with the increased clocks we managed to push it all the way to 955MHz core and 1030MHz memory – completely stable. This is a nice 12 per cent core increase and a further 6 per cent memory increase, which is quite respectable.

Performance of the single card was solid (just keep in mind that the scores are higher thanks



to our Nehalem rig) compared to the previous 4870, and this has gains across the board due to the higher clockspeed and more efficient design. Crysis was particularly impressive, hitting an average of essentially 60fps. But what if you want more?

## Moar firepower!

Not content with running just one of these new cards, we pleaded with ASUS to lend us another card. Thankfully our pals there agreed, and with a flourish they handed us an identical card for that thing we love most – multiple-GPU performance testing.

Crossfire with these cards works exactly the same as any other two ATI cards – simply install them both in a Crossfire-capable mobo, throw the two Crossfire ribbon cables on (one is included with every card, so you're never left wanting), and cable them up to a suitably beefy power supply.

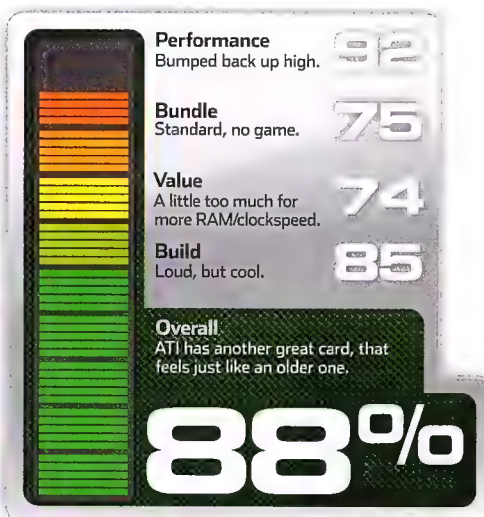
Using a special version of the Catalyst 9.3 suite, this detected the Crossfire as soon as we

got into the desktop, activated it, and off we went. Performance increased again in Crysis and GRID, though it had some serious graphical issues with 3DMark Vantage, and was in fact slightly lower than a 4870X2 in 3DMark06.

Temps only increased slightly in Crossfire, hitting 54 idle and 70 load for the top card, while noise didn't increase by more than 0.4dBA. We even hit the same OC for the single card – while in Crossfire!

## Graphics ring king?

While we'd love (and we're sure ATI would also love) to say that this is the best performing card you can buy, we won't. It's got great performance for a single-core card, and Crossfire only increases that, but the 4870X2 is still a very tempting proposition compared to the 4890. That said, for a single card that has the grunt and overclocks well – it's just what the doctor ordered. JR





# XFX 4890 XXX

Just look for the X on the shelves!

Street Price \$470 Supplier XFX

Website [www.xfxforce.com](http://www.xfxforce.com)

**Specifications** 900MHz core; 975MHz memory (3900 effective); RV790XT core; 800 shader units; 1GBMB GDDR5; 256-bit memory interface; dual slot PCB with active cooling; dual 6-pin PCIe power connector

**Card info** [www.techpowerup.com/gpuz/f5ak8/](http://www.techpowerup.com/gpuz/f5ak8/)



**X**FX won our top 100 graphics card poll last Issue, with its performance and great support being the most noteworthy and most often mentioned things that the company does well. This card is technically similar to the two ASUS 4890s that we look at in this very issue, but as you'll see in a very short space of time there are some fundamentally different – and awesome – changes.

It's based on the same RV790XT chip that we went into detail about, but in case you need a refresher it's a chip manufactured on the 55nm process. Eight hundred shader units chomp through graphical information, while the 256-bit memory bus keeps the gigabyte of GDDR5 filled to the hilt with chunks of delicious oozy data. It also features the same Decap ring that every RV790XT chip has, which aims to provide extra stability at high clocks with the relatively small addition of three million extra transistors.

Since this is the XXX edition, the card runs a stock overclock of an impressive 50MHz on the core, while the memory speeds remain the same. Already increased over the RV770, this is pretty good to see. Not only does it have this overclock

big sticker on the top. This one has some generic metal, as well as the XFX logo. Underneath this is a large copper block that mounts on the core of the card, with three heatpipes and a large aluminium heatsink to draw the heat away then radiate it. A powerful squirrel-cage fan sits at the end, which inhales cool air and exhales it out the back of your rig – most of it, anyway. We took one of these cards apart online ([www.atomicmpc.com.au/?141520](http://www.atomicmpc.com.au/?141520)), and this one is put together virtually identically.

The design allows it to trundle along at idle with a temp of 58 degrees Celsius and 56.9dBA, though

this through software, however.

We weren't quite satisfied with the factory overclock, so instead we pushed it 'til it squealed at us, then pulled off a fraction and were left with final clockspeeds of 965MHz core, and 985MHz memory. While it's only a tiny increase on the memory, the extra speed on the core was better than the ASUS cards could manage.

Performance for the card was very nice, topping ASUS' scores by 500+ on 3DMark06, more than 400 on Vantage and getting higher average frames in Crysis (admittedly this was only like one frame per second extra, so you won't notice it at all, but it counts!). Overclocking increased the performance even more, while still remaining stable under load.

The bundle is quite nice, providing all the cables and drivers that you'd need as well as a full copy of HAWX. It's packed into a giant X shape – literally an X, which will look incredibly attention-grabbing on the shelves and the best part? The price is low enough to only be a \$50 jump from the basic cards, which gives you an overclock *and* a game. **JR**

## We weren't quite satisfied with the factory 'clock, so instead we pushed it 'til it squealed.

out of the box, it's also warranted for the stock overclock (and they won't know easily if you decide to push it further either, if you don't mention it).

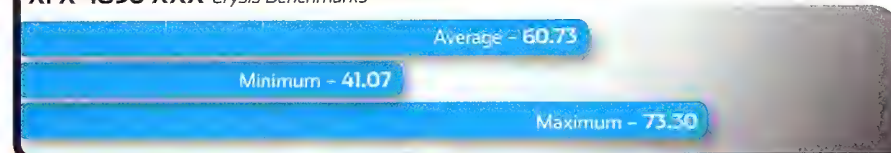
Physically the card is pretty impressive, following a similar design to the past high-end cards from ATI – a large translucent red shroud, complete with

this rockets along to 70 degrees and a rather loud 72.8dBA. Oddly this seems to be due to the fan deciding to wait slightly longer than usual to increase in speed, only doing so at the last minute to VROOM out the heat building up. Being a 4-pin PWM fan means you can take control and adjust

### XFX 4890 XXX 3d Mark scores



### XFX 4890 XXX Crysis Benchmarks



**Performance**  
Nice stock overclock, decent headroom.

98

**Bundle**  
Comes with a relatively new game.

88

**Value**  
Affordable overclock, worth it.

90

**Build**  
Loudish, but does the job.

82

**Overall**  
XFX's card and bundle gives performance and value – what's not to like?

90%



# Plantronics Gamecom 777

Powered by Dolby!

Street Price \$94 Supplier Anyware  
Website [www.anyware.com.au](http://www.anyware.com.au)

**G**aming headsets are something that are supposed to enhance your experience, but they're exclusively stereo (or 2-channel) audio. The 777's are a USB-dongle-powered headset, which contains the sound processor – meaning you only need a USB port to use them.

These are essentially similar to the Plantronics 367 we looked at in Issue 100, but the 777's are aimed directly at the ear-holes of the most discerning gamers out there, and are aiming to become the gaming headset of choice.

Two standard gold-plated 3.5mm audio jacks (one for mic) are used, so you can still use it with any other device you'd like to. A thick liquorice textured cable connects them to the headset proper, and is close enough to a single tech writer in length, or two metres. About a foot from the headset is a control dial for audio, and an on/off switch for the mic.

Two large hard plastic cups house 40mm Neodymium drivers, and these are open to allow airflow – they didn't get too hot under

extended use at all. A cushiony felt/foam is used around the cups as well as underneath the headband, which is soft to the touch. Covering the drivers themselves are thin coatings of foam.

The headband is made of dull grey plastic, with a microphone tucked into the left-hand side. Sound is nice too, with excellent virtual 5.1 support through the Dolby unit, though we found that bass was often hugely exaggerated, sometimes to the point of being uncomfortable. All things considered though, these performed admirably during games and certainly make you feel every single shell, shot or stab as they boom along.

If you're after something with a little versatility, good sound quality and virtualised 5.1, this is close to the cheapest that you can get – and a solid choice too. **JR**



**Overall**

For virtual 5.1, good build and nice sound this is definitely worth it.

**91%**

# Microsoft X8 Wireless Gaming Mouse

Why hasn't anyone else thought of this?!?

Street Price \$104 Supplier Microsoft  
Website [www.microsoft.com](http://www.microsoft.com)  
Website [www.atomicmpc.com.au/7139430](http://www.atomicmpc.com.au/7139430)

**I**t really galls us to say this, but we have a soft spot for Microsoft's latest range of gaming peripherals. We were very fond of the X5 mouse and X6 keyboard reviewed in issue 95 (those reviews are on our site, by the way), but this mouse goes one step further and actually brings some true innovation to wireless peripherals.

One of the real issues with using a wireless product when you're gaming is dealing with it when it runs out of charge or the batteries die. It's usually a pretty solid brick wall, stopping your experience dead and leading to grief and the gnashing of teeth (hey, we love our gaming!). But Microsoft – and we don't say this often, so enjoy it – has outdone itself to come up with an elegant solution to the problem. Magnets!

The X8 features a base station like many wireless products, that plugs into your PC's USB port, and deals with the fiddly process of beaming signals from your PC to your mouse. But that's not the only cable snaking from it – there's a mouse cable that ends in a magnetised adapter. It's designed in such a way

that at the first signs of trouble you can simply tap it with your mouse and it'll attach, correctly, first time and every time.

It is, simply put, brilliant.

The mouse itself combines the best features of the X5 and previous MS mice. It's well weighted, erring on the heavier side of things, which suits us just fine. It's technically bigger than the X5, but feels oddly smaller. We think it's the subtle differences in the curves, allowing you to grasp the mouse with thumb and ring finger just about perfectly. It has on the fly DPI switching, which you can set up in the mouse's settings on your PC, well placed thumb buttons that improve on the X5 as well, and all seven of the buttons (the scroll wheel tilts left and right also) are programmable.

We still think the X5 wins on scroll-wheel performance, but the X8's metal wheel is certainly more responsive than previous MS attempts. And, impressively, it's still in the \$100 range – for the ease of use of the magnetic cord, and solid and precise wireless performance, this is a mouse we love – with no reservations. **DH**



**Overall**

We're ditching our X5 in favour of the X8 – 'nuff said.

**93%**



# OCZ Eclipse Double-laser Gaming Mouse

Twice the mousey power!

Street Price \$60 Supplier OCZ Technology  
Website [www.ocztechnology.com](http://www.ocztechnology.com)

**T**here's a lot to like about the Eclipse, from its hyper-frictionless feet to the toggle switch for changing DPI around, but at the same time... it's kinda hard to feel drawn to this mousing effort from OCZ.

It's hard not to look at the name of this mouse without thinking of the Double-Meat Palace from the later seasons of Buffy the Vampire Slayer. Or perhaps that's just us. There's a link though – this is one of the slickest mice we've ever used, practically sliding across a surface without any outside intervention; perhaps it's exuding greasy goodness? (It's called Teflon! -Tech Writer) Regardless, for twitch-gaming on even an average mousing surface, this mouse performs well.

The DPI level, of which there are four, can be programmed along with an array of macros and other custom, game-based settings. This is done via the included software, but the actual data is stored in onboard memory on the mouse. Once set up to your liking, you can take the Eclipse anywhere. It'll make a great LAN

tool. You can even edit the USB report levels – there's a lot to customise here.

It's a little short on buttons, but that's not too much of a bad thing – too many things to press, switch or rock can sometimes be distracting. The scroll-wheel is rubbery and reasonably responsive, and the rubbery overall coating ensures a tight grip at all times. Well, it would, were it not for how narrow this mouse is through the grip.

We're not a bunch of fat-handed twats here at Atomic by any means, but this mouse is still too narrow for any but the smallest of hands. Gripping the Eclipse by thumb and ring finger requires a just too-uncomfortable level of pressure, translating as slightly depressed performance in-game. In many ways it feels more like a laptop mouse than a fully-fledged gaming device. As to the Double-laser angle, OCZ claims it makes a hell of a difference, but we couldn't extract any more accuracy from it.

As we often say, mice are hard to judge objectively. The Eclipse is a perfect illustration of this; if you're looking for a smaller mouse, with



good features and reasonable price, this is your puppy. But for most gamers, it's just a touch too small. **DH**



# Genius LuxeMate 525 Starcruiser gaming keyboard

Cruise the stars or crash and burn?

Street Price \$54 Supplier Altech Computers  
Website [www.genius-europe.com](http://www.genius-europe.com)

**W**hat's in a name? Usually, not much, but when you look at a name like the one this Genius keyboard is stuck with, you gotta wonder – is it compensating for something?

We can say for sure it's not compensating for any size issues. With its tacked on gaming pad, this keyboard is on a par with the giant Logitech gaming monsters, though not as massive as those beasts. Rather it's long and slim, a design set off by the clear plastic highlight running around the keyboard's edge. It would be elegant, except for the garishly coloured gaming keys. Unfortunately the slimness also translates into a lot of flex and wobble in the keyboard. If you like to lean into a fight, or tend to take out frustrations on your hardware, this is not the board for you.

In fact, it's not really the board for anyone. Once you sit down to some gaming – hell, even just typing – you discover keys that are just too sticky, a cramped main board, and a very oddly

designed gaming pad. The traditional gaming setup uses the 'R' key for reload; it sits to the right of the WASD keys. However, Genius, has decided to move its dedicated reload key to the left of the movement keys! Counter-intuitive, much? Add to the that the just odd-enough shape of the stand-in WASD keys, and too-short Jump key, and you get a sum of frustration that can be seen from high orbit. At least the various short-cut keys spread along the top of the board work without trouble – there's even a system lock key that logs you out at the press of a button. That's actually pretty handy.

You might think that a new gamer could get around this, but then they'd butt heads with the Starcruiser's macro software, which is counter-intuitive at best. Try as we might we simply could not get the macros to actually stick – they'd seemingly disappear rather than save, or simply just not work.



At least the price is not too exorbitant, but you're still not really getting what you pay for. Spend a few extra dollars and stick with the Razer Arcosa, or, even better yet, save pennies and splash out on Microsoft's X6. **DH**





# Razer Arctosa Gaming Keyboard

A Razer product we don't dislike? Stranger things have happened...

Street Price \$64 Supplier Audion MM  
Website [www.razerzone.com](http://www.razerzone.com)

In issue 99 we reviewed Razer's limited edition Mirror keyboard, and were not all that impressed with the sickly shiny beast. This issue, we get to hang out with its slightly plainer, cheaper but infinitely more practical cousin, the Razer Arctosa.

If you've seen one Razer keyboard, then you pretty much know what to expect in form and function from the Arctosa. The difference is in the way it's been dressed up – it features the high-gloss of the Mirror on the key surround, while the keys themselves are plain, white-lettered versions of the slightly squashed design that Razer favours. No lit-up characters, no odd matt-rubbery finish like earlier models – just reasonably plain keys. Even the lighting on the Caps Lock and similar indicators is plain white.

To be perfectly honest, this is a look we actually like on Razer gear.

The action of the keys is a little heavy for us, and oddly shallow thanks to the key design. As we tend to spend a lot of our time typing, we prefer the fuller travel of a more traditional design, but for someone who spends more time sniping than writing this will be less of an issue. Still, if

you prefer a lighter response in your gaming, you might want to look elsewhere. Razer also touts a ghosting-free area around the all important WASD keys, but in practice this is barely noticeable from the response you get on any modern keyboard.

At least the full size keyboard has everything you could look for, and two feet snap down underneath the Arctosa to alter the typing angle. The front wrist rest is attached securely by a series of screws – this makes it a little more work to remove than some other keyboards, but it least it translates into a very secure arrangement.

The included driver disk installs software that lets you switch your keyboard setup on the fly, and there are conductive media keys. The problem with these, however, is that they lack any kind of feedback that you've activated them properly. Still, it's a fancy touch that will sway some or simply not matter for others.

Probably the best point about the Razer is its price, well within the \$60 sweet spot. Sure, there are no advanced functions to play with, like



on-the-fly macro functions or inboard memory, but for a basic keyboard with bare minimum gaming functions and stylish looks, we feel this a cut above other Razer products. **DH**

#### Overall

A solid contender from Razer, if you're looking for a basic gaming keyboard.

**79%**

# AOC V22 monitor

LED-lit wedge of a monitor!

Street Price \$350 Supplier AOC  
Website [www.aocmonitor-anz.com](http://www.aocmonitor-anz.com)

Specifications tilt; HDMI (w/ HDCP); VGA; 1680x1050; 2ms, USB hub, webcam, microphone

A nice, big LCD screen is the current best for gamers and multimedia buffs simply due to the huge amount of screen you've got to play with. Being wide helps to see more in-game, and this is definitely something handy if you're a fan of online competitive play, or interface intense games like MMOs.

AOC's latest screen is the V22, styled similarly to something you'd expect in a Japanese postmodern bar. A large plastic bevel surrounds the screen, which stretches out in a very distracting way. The clear plastic at the edges catch the light of objects behind it annoyingly, and being so glossy means fingerprints are frustratingly common.

This glossiness extends itself to the screen too, and is so much so that you can actually see yourself reflected in it while turned off! Any light source behind you will become an

annoying blob, and it's just as likely to be coated in fingerprints too. Luckily AOC included a lint-free microfiber cloth for just this purpose.

The monitor clicks onto the base plate, and screws in with a simple, thickly threaded thumbscrew. Sadly the build quality is terrible, being quite unstable as well as making disconcerting plastic flexing noises when moved. The base is actually made of glass, which can shatter if you're not careful, though the addition of a USB hub, webcam and microphone kind of make this annoyance worth it. Tipping the scales back to the negative is the lack of DVI, with only HDMI and VGA present, and there's no included DVI-to-HDMI adapter, a horrendous oversight for any bundle.

The image quality is nice though, and the LED backlighting can get strong enough to peel the flesh from your cheeks from a few metres back – all while remaining rather thin. Motion was fine, and colour reproduction was decent too, adding up to one average monitor. **JR**



#### Overall

Not the best, but cheaply offers some good features.

**77%**



# OCZ Vertex 120GB

A whopping 64MB of cache – is this drive worth the cost?

Street Price \$655 Supplier OCZ

Website [www.ocztechnology.com/](http://www.ocztechnology.com/)

Specifications 120GB; 64MB cache; 2.5" form factor;  
SATA 3Gb/s

**S**SDs are becoming more and more popular, as people latch onto the (very smart) idea that solid state can do a lot for you that traditional spinning media like hard disks can't. They're not the be-all and end-all, but they can provide speedups and improvements in certain areas; but how do you differentiate yours from the crowd?

OCZ's Vertex drive has an idea about this, in the form of 64MB of cache. Just like the 16MB cache that most HDDs come with today, this is a buffer that can hold frequently-used data, as well as holding it temporarily for the write controller to use it more efficiently. On a spinning disc this is a good idea, as it gives access when the disc is moving to get to a location, but does it make

a difference in a solid-state medium?

Well, it does the job. Compared to the OCZ Apex drive from last issue, it gets a higher average read at 223.93MB/s, a faster access time of only 0.1ms at a cost of the burst speed – lowered to 196.1MB/s. We copied around files and generally did strange things with the drive, and found that we got an average of 92.3MB/s copying the Crysis install from one drive to this, actually about 8MB/s slower than the cacheless Apex. The price difference between the two is \$110, and for that the capacity remains the same, with performance not changing enough to justify it. Cache on SSDs might help eventually, but right now we need more bandwidth to take full advantage of it – bring on SATA 3.0. **JR**



Overall  
Similar speed for a larger price.

**72%**

# Scythe Gentle Typhoon 1850RPM

Hyper Cooling; Nano Vibration; Comfortable Tone!

Street Price \$30 Supplier Scythe USA

Website [www.scythe-usa.com/](http://www.scythe-usa.com/)

Specifications 120mm Fan; standard screws; double ball bearing with 100,000 hours MTBF @ 35°C; 3-pin fan to molex included

**A**s far as fans go, they're usually one of the more overlooked parts of a rig – after all, don't they all just move air around? While that is indeed their main function, how they do it is different – and choosing the right fan is paramount to ensuring the best cooling.

This fan from Scythe is its latest design, a simple black frame and grey blade colour scheme that should fit in almost anywhere. It's got ten incredibly curved blades, each with two notches close to the centre of the fan – these are similar to the bumps on a whale's fin, and allow the fan to push air with less resistance. They also channel the air away from the fan's blades, rather than along the length of them (as the packaging proclaims, copied at the top of this review).

A dual-ball bearing is used and while this

isn't the best bearing in terms of noise it is reliable, and will last in high-heat uses such as CPU cooling. The fan runs on 0.083A through the 12V power rail; essentially consuming a single Watt of power. There is no PWM cable, and the length was disappointingly short, so make sure you have a fan controller with some extension cords if using this as a case fan.

We strapped the Typhoon to our TRUE, and recorded very similar results to the reference fan, idling at identical levels and hitting a peak load of only a single degree above, even when overclocked. The real strength of this fan isn't in CPU cooling however, but instead as a case fan due to the huge pushing power available – the air can be felt moving up to three feet from the blades!

At a noise level of only 53.5dBA it's incredibly quiet for such a fast-spinning fan and while the



price is a little up there, at \$30, for case cooling there is really nothing else we'd recommend. **JR**

Overall  
Pricey, but unsurpassed cooling prowess.

**90%**

## Scythe Gentle Typhoon 1850RPM

7965 w/ Thermalright Ultra 120 Extreme	Scythe Typhoon @ High - 59.6dBA		Thermalright reference fan	
Idle	Stock: 36	OC'd: 38	Stock: 36	OC'd: 38
Load	Stock: 56	OC'd: 62	Stock: 55	OC'd: 61



# Corsair Dominator TR3X6G1866C9DF

Because red makes everything faster.

Street Price \$445 Supplier Corsair  
Website [www.corsair.com/](http://www.corsair.com/)

Specifications 3x 2GB kit; PC3-1500; DDR3-1866; 8-8-7-20; 1.65v; 240-pin DIMM; Non-ECC Unbuffered DDR3; Micron ICs; Lifetime warranty

**T**riple channel memory kits for Nehalem's new platform are pretty common, with not too much to differentiate them. They're all DDR3, and contain either 1GB or 2GB per stick for a total of 3GB or 6GB. While whichever size you pick won't necessarily affect performance too much (unless you're running a bloated Vista install), the real important part is the specs – or are they? Kits out there run from 1066MHz all the way to 2000MHz; the Dominator kit here falls

in at 1866MHz.

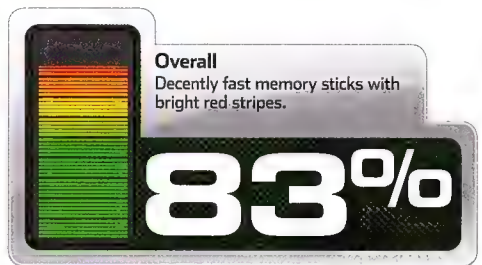
Running these settings at the XMP or Xtreme Memory Profile (settings which also include 8-8-7-20 timings and a voltage of 1.65V), gives us an easy way to get the performance expected out of the sticks. It's a nice balance between frequency and timings, but we weren't satisfied with just leaving it at stock settings so we bumped the frequency to 2000. Sadly we had to increase the timings too, and at a rather slow 9-9-9-27 this makes the performance pretty similar overall.

They were easy to push beyond this but performance began decreasing after this speed – due to high latencies. The one thing that didn't really affect these sticks was heat, and they became mildly warm when under load. Corsair includes a dual-fan add-on that clips over the memory sticks – this didn't appreciably increase overclocking performance and instead generated an annoying 72dBA of noise. Unless you're computing in 50 degree ambient temps, you should be okay without this fan.

The sticks themselves are black with a red sticker, topped with cherry red fins. They're entirely made of machined aluminium, and exude



a lot of quality. With a price that's about \$140 cheaper than the first Corsair Dominator triple kit we looked at back in Issue 96, this is a great choice for a rig with a decent enough amount of headroom for some tweaking. **JR**



## Corsair Dominator TR3X6G1866C9DF

	1866MHz; 8-8-7-20(TT); 1.65V – Stock	2000MHz; 9-9-9-27(TT); 1.7V
HexusPIFast	26.30s	26.54s
wPrime32M8x	7.631s	7.674s
Everest Read	19104 MB/s	19142MB/s
Everest Write	15014 MB/s	16456 MB/s
Everest Latency	27.6 ns	28.3ns

# Hitachi Deskstar 1TB

So many megabytes!

Street Price \$185 Supplier Hitachi  
Website [www.hitachi.com](http://www.hitachi.com)

Specifications 1000GB; 3.5in form factor; SATA 3Gb/s

**T**raditional hard drives may not be under the razor-sharp focus of the performance community at large, but for most everyone they're the best choice for affordable storage and system drives. This one has an awkward name (the DeskStar 7K1000), but physically it's similar to every other HDD you've used before.

In terms of value, for every buck you spend you're getting 5.4 gigabytes of space (though when you consider how much of this is usable, it is more like a 931GB HDD at 5GB/dollar). This is significantly improved over drives of the past, and for the person who just refuses to throw anything out it's great – you can simply chuck one of these in every time you think you're running out of space and get to work filling that one too!

What it boils down to is the performance

of the drive, specifically if it's fast enough to look at for delivering good performance in load intensive tasks. The Deskstar gave us an average read of 98.4MB/s, an access time of 13.63ms and a burst speed of 259.77Mb/s. Copying the Crysis install gave us an average of 85MB/s. Compared to a Seagate 1.5TB drive ([www.atomicmpc.com.au/?141622](http://www.atomicmpc.com.au/?141622)) this is slower in every way except for a slight improvement in access time.

Keeping in mind that you're getting a higher amount of gigaspace or megajiggers (whatever your units) and a faster drive at the 1.5TB end of the scale with the Seagate, it's really worth thinking long and hard about spending a little extra and making that jump – though you're still getting good value with this Deskstar. **JR**





# Coolermaster Gladiator 600

A case for the people.

**Street Price** \$109 **Supplier** CoolerMaster  
**Website** [www.coolermaster.com](http://www.coolermaster.com)

**Specifications** 485 x 202 x 440mm (D x W x H); 7.2kg empty; 5x 5.25in drives bays; 6x 3.5in drive bays; 2x USB2.0, 1x mic, 1x audio, 1x e-SATA; 1x 120mm fan (blue, front), 1x 140mm fan (top); m-ATX, ATX; Steel, ABS plastic, mesh front.

**Photo gallery** [www.atomicmpc.com.au/?143184](http://www.atomicmpc.com.au/?143184)

**T**here are some cases that are simply a joy to review. Higher end Lian Li models come to mind, as do some of the fancier Thermaltake makes. But sometimes, a user is just going to want something reasonably simple, well-priced, and with enough cooling options that they can dabble in a bit of overclocking without turning their expensive gear into so much burnt silicon.

That describes CoolerMaster's Gladiator to a T.

But, man... does it make it hard to review!

The Gladiator is a stolid example of a mid-size, mid-range case, with just enough features and design elements to separate it from the mediocre beige pack. The front fascia is a pleasing array of black mesh hiding a blue LED-lit fan, broken up only by a dark-chrome band that houses the IO ports. It's actually a very attractive look, at least to our eyes.

The left-hand panel features two meshed areas with optional fan mounts, while the top of case has single meshed area and a 140mm fan blowing warm out of the case. It's all plain black metal; nothing exciting, but no poor design decisions, either. The back is similar – bare metal, some drilled out areas for a boost in airflow, and another 120mm fan mount. In fact, the amount of fan mounts is pretty impressive, and with a few Scythe fans (as reviewed this issue on

p.44) you could have a pretty thoroughly cooled case.

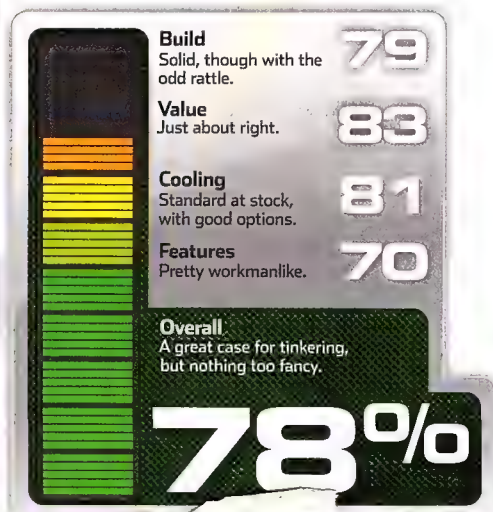
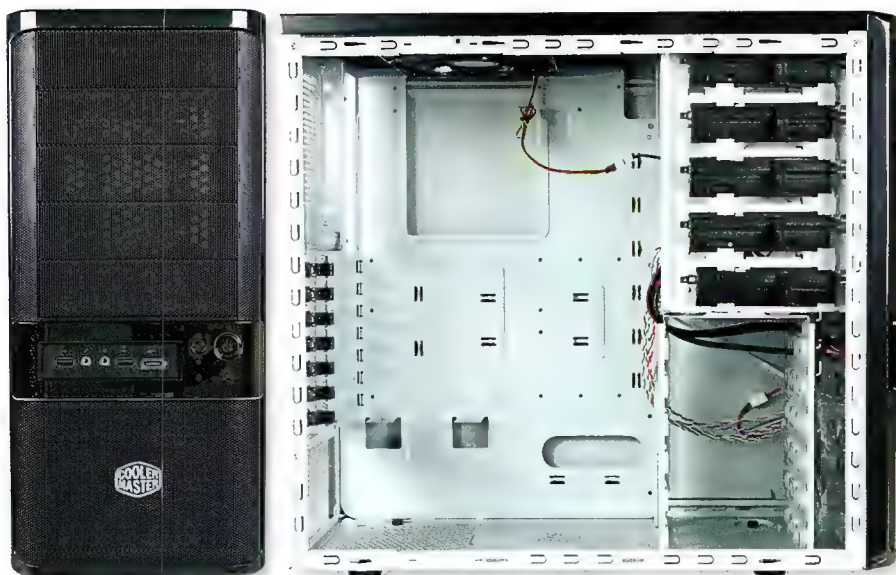
The interior picture is where the mid-range nature of this case really comes to light. It's all bare metal, with few whizz bang features. However, the edges are all well-finished, there's a nice cutout in the motherboard backing plate which should aide in keeping overcharged CPUs a wee-bit cooler, and some interesting tool-less design options. Well, actually, just one: the 5.25in bays are secured by a rather neat sliding latch that secures its charges nicely, and has a minimum of moving parts. Sadly, the tool-less option for the expansion slots is a riff on Thermaltake's annoying catch system, which is both remarkably insecure (compared to good old fashioned screws) and won't work with fully shrouded video cards, like a GTX280 or similar.

Then again, the size of this case all but precludes the use of larger cards, and don't even think about squeezing something the size of Galaxy's GTX 275 offering from this issue. It simply



will not fit, given the placing of the 3.5in drive bays, oriented to face out from the case-side.

Overall this is actually a pretty solid case for a simple PC build with some optional overclocking. It's well ventilated, looks pretty schmick for the price, and isn't too heavy. Sure, there are some flaws, but for a cheap and cheerful gaming case, or even something you might want to build for a non-1337 friend, it's a solid choice. **DH**





# NRG Typhoon

Another solid system from Altech and NRG.

**Street Price** \$1799 **Supplier** Altech Computers  
**Website** [www.altech.com.au](http://www.altech.com.au)

**Specifications** Intel Core 2 Duo E8400 (OCed to 4.05GHz); Gigabyte G Power II Pro cooler; DFI JR-P45-T2RS motherboard; 4GB Corsair RAM @ 900MHz (5-5-5-18); Hightech HD 4870 GPU with 512MB of RAM; Samsung 640GB HDD; Samsung DVD burner; Antec Mini P180 case, Antec NeoPower 500W PSU; Vista Home Premium 64-bit.

If there's one thing you can know for certain when you unbox an NRG system, it's that the builders at Altech really know their stuff. The latest Typhoon system, their mid-range gaming brand, is no exception, but nor is it exempted from some of the long term issues we've had with these gaming powerhouses.

Out of the box, the first thing that struck us is that this is most branded of any NRG system we've seen. The three-letter logo is stuck on both side-panels, and to the front of the machine. It's easy enough to peel off if you don't like it, however. The case itself, a new Antec P180

## USB dramaz

Without doubt, there has not been a single NRG system we've seen that doesn't experience connectivity issues, especially when it comes to USB peripherals. We've frequently found that any given peripheral – keyboard, mouse, headset – will not be recognised at startup; you'll need to move it from port to port to get the system to recognise the hardware. It's less of an issue for this latest Typhoon, but we did experience the problem. The only constant through all of the system's we've tested are the Antec cases, so we figure that's the culprit.

is a compact number in black and gunmetal, with chrome highlights on the front fascia.

But it's the interior build where NRG really shines. Once you slide off the side panel you discover two things – an immaculate cabling job, and a surprising amount of fan noise from the kind of tacky chromed-plastic Gigabyte CPU cooler. The P180's baffling does an incredible job of keeping that noise to a minimum!

The cabling though, is just marvelous. There's not a single obstruction to the airflow, with all power cables and cords tucked up behind the P180's motherboard plate or neatly cable tied out of the way. This is exactly the kind of workmanship that makes paying for a computer, rather than building your own, actually worthwhile. About our only gripe is that there is no slack in the HDD cabling; given the P180's sliding tray arrangement for drives, you'll need to disconnect cables before hauling out the tray.

At least there's lots of room for upgrading, though that will require a more strenuous than usual de-build as you snip cable-ties and such.

The guts of the machine is an overclocked E8400 from Intel, bumped up from 3GHz to 4.05GHz – an impressive boost, and guaranteed stable. It's backed up by two 2GB sticks of Corsair RAM, too, which means that adding more RAM is a breeze given the two unused slots on the DFI board. Thankfully, the techs have gone with a 64-bit version of Vista, so you'll be able to enjoy all that RAM!

The last part of the Typhoon's engine room is



a HD4870 sporting 512MB of RAM. All together, this setup delivered solid scores across all of our benchmarks, delivering a 31 frames per second in our Crysis tests, and 14,785 and P8636 in 3DMark06 and Vantage respectively. It's a low Vantage score, but that's the difference between ATI and Nvidia's PhysX, which Vantage is optimised for. Unless you have an absolute need for PhysX, don't sweat it – this is a machine that can handle pretty much anything a gamer could throw at it, and still have room for future upgrades.

\$1800 leaves you enough change from dropping two grand that you'll be close to affording a 22in monitor, and chances are you've already got a mouse and keyboard (or five) floating around. There's lots of room to upgrade, as we've said, but this is a spec which will see you happy for some time, whether in performance stakes or storage versatility.

Another fine job from NRG. **DH**



**Performance**  
Very solid – you'll have reliable gaming.

91

**Value**  
Tough with pre-built systems; this isn't bad.

81

**Build**  
Top notch cabling and stable OC.

93

**Upgradeability**  
Lots of room to move.

89

**Overall**  
A super effort from NRG for any gamer.

89%



# Budget busting Upgrades [PART 2]

Don't break the bank when you're building your next PC!

**A**lthough it's fun to plan which components you'd buy if you had an unlimited budget to spend on a new PC, there comes a time in every enthusiast's life when they need to build a new system on a tight budget. Whether you're building a second PC while your overclocked rig is being rebuilt, a system for your children/significant other, or a PC for university, this Labs test details which components you need to buy.

While the choice of case and other peripherals will have an effect on the finished PC, the two most important components to consider are the CPU and motherboard. For this Head2Head, we rounded up a selection of each component, all very reasonably priced, so you can find out which

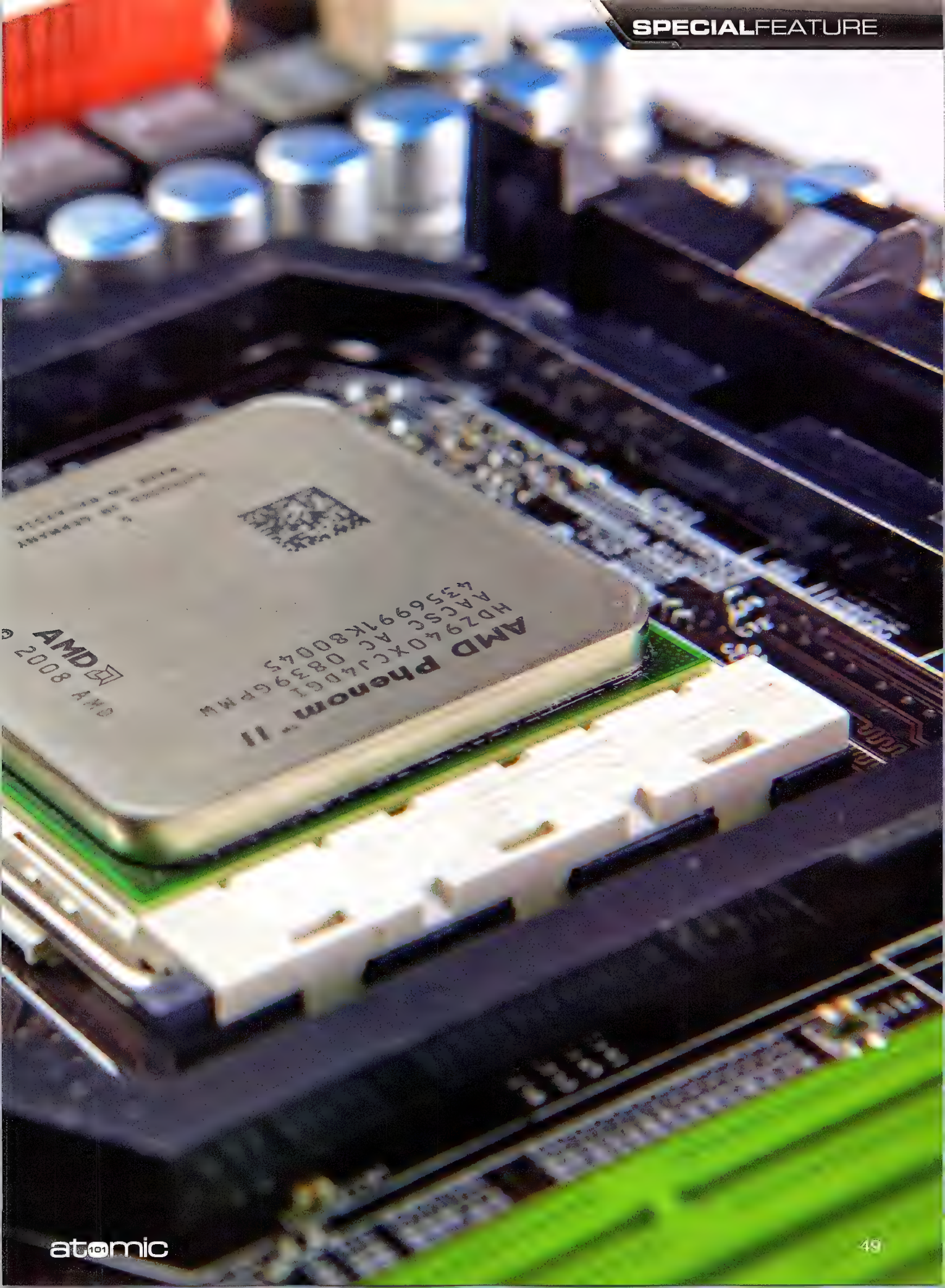
case components to buy to build a great PC on a tight budget.

The first section of this Labs test looked at the cheap and cheerful segment of the CPU market (in issue 100), while this second part looks at a selection of LGA775 and Socket AM2+ motherboards.

Incidentally, if you pair this with our Budget Graphics Card Head2Head from a few issues ago (and online here [www.atomicmpc.com.au/?137568](http://www.atomicmpc.com.au/?137568)), you'll have the makings of a very good – and well-priced – system.

So, to find out which components you should buy to build a budget-busting PC that will give many much more expensive PCs a thorough kick up the backside, read on.







## LGA775 Motherboards

	Asus P5Q	Asus P5QL-E	Biostar TP45 HP	Foxconn P43A	Foxconn P45A	Gigabyte GA-EP43-DS3LR
<b>Street Price</b>	\$135.00	\$158.00	N/A	\$124.00	\$147.00	\$195.00
<b>Manufacturer</b>	www.asus.com	www.asus.com	www.biostar.com.tw	www.foxconnchannel.com	www.foxconnchannel.com	www.giga-byte.com
<b>Chipset</b>						
<b>Chipset</b>	Intel P45	Intel P43	Intel P45	Intel P43	Intel P45	Intel P43
<b>RAID</b>	Intel ICH10R (6 x SATA II)	Intel ICH10R (6 x SATA II)	None	None	None	Intel ICH10R (6 x SATA II)
<b>Ports</b>						
<b>PCI</b>	3	3	2	3	2	2
<b>PCI-Ex16</b>	1	1	2	2	2	1
<b>PCI-Ex4</b>	0	0	0	0	0	1
<b>PCI-Ex1</b>	2	2	2	1	2 (PCI-E 2.0)	4
<b>DIMM</b>	4 x DDR2	4 x DDR2	4 x DDR2	4 x DDR2	4 x DDR2	4 x DDR2
<b>EIDE / FDD</b>	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
<b>SATA</b>	8	6	6	6	6	6
<b>Cooling</b>						
<b>Free fan headers</b>	3	3	2	2	2	3

## Socket AM2+ Motherboards

	Asus M3A78 Pro	Biostar TA790GX-A2+	DFI Lanparty DK 790FX-M2RS	Foxconn A78AX-K	Gigabyte GA-MA790X-DS4	MSI KA790GX
<b>Street price</b>	\$157.00	\$149.00	\$195.00	\$100.00	\$189.00	\$200.00
<b>Manufacturer</b>	www.asus.com	www.biostar.com.tw	www.dfi.com.tw	www.foxconnchannel.com	http://www.giga-byte.com	www.msicomputer.com.tw
<b>Chipset</b>						
<b>Chipset</b>	AMD 780G with Radeon HD 3200	AMD 790GX with Radeon HD 3300	AMD 790FX	AMD 770	AMD 790X	AMD 790GX with Radeon HD 3300
<b>RAID</b>	AMD SB700 (6 x S-ATA II)	AMD SB750 (6 x S-ATA II)	AMD SB600 (4 x SATA II)	AMD SB700 (6 x S-ATA II)	AMD SB600 (4 x S-ATA II)	AMD SB750 (5 x S-ATA II)
<b>Ports</b>						
<b>PCI</b>	3	2	3	3	2	3
<b>PCI-Ex16</b>	1	2	2	1	2	1
<b>PCI-Ex4</b>	0	0	1	0	0	0
<b>PCI-Ex1</b>	2	2	0	2	2	1
<b>DIMM</b>	4 x DDR2	4 x DDR2	4 x DDR2	2 x DDR2	4 x DDR2	4 x DDR2
<b>SATA</b>	6	6	4	6	4	5
<b>Cooling</b>						
<b>Free fan headers</b>	2	2	5	2	2	2



## ASUS P5QL-E

Once again, the P43 chipset fails to shine.

Street Price \$158

Manufacturer [www.asus.com](http://www.asus.com)

At the time of writing, the all-encompassing P5Q-series of Asus motherboards spanned a ludicrous 24 different models, which are all variants of one basic design.

The P5QL-E sits near the bottom of the range and is based on the Intel P43 chipset. The P43 chipset doesn't officially support 400MHz FSB CPUs but, like other manufacturers, Asus has modified the BIOS so that the P5QL-E does. Although the P43 chipset supports CrossFire, it doesn't have enough PCI-E lanes to do it justice, so Asus has sensibly decided to only fit one 16x PCI-E slot on the P5QL-E. There are also two 1x PCI-E slots, plus a trio of PCI slots at the other end of the PCB.

Since we're talking about the PCB, it's worth pointing out that while the Northbridge and Southbridge are fitted with small copper-coloured (but actually aluminium) heatsinks, the VRMs aren't cooled. This could lead to problems if you significantly overvolt any

components for more than a few minutes.

The placement of the 24-pin ATX power socket also leaves a lot to be desired. Its location, adjacent to the Northbridge and 16x PCI-E slot, means that its bulky cable will straddle the motherboard, whether the PSU is at the top or bottom of your case. The P5QL-E sports six RAID-capable SATA ports, a dozen USB 2 ports as well as a pair of FireWire ports.

The P5QL-E posted benchmark scores midway between the Foxconn and Gigabyte P43 motherboards, and has the most comprehensive and user-friendly BIOS. However, the BIOS doesn't fully recover from an overly ambitious overclock, forcing you to clear the CMOS and lose all your settings. Eventually, we succeeded in benchmarking the P5QL-E stably with a maximum FSB of 410MHz; this is hardly an earth-shattering overclock, given that a P45 motherboard costing not a lot more can benchmark at well over 500MHz.



Unlike the Foxconn P43A, which is merely slow and awkward to work with, the P5QL-E's faults are more serious. You could buy some heatsinks for the VRMs, but given the poor PCB layout, we'd advise simply skipping the P5QL-E altogether and buying another motherboard instead.

Overall

An underwhelming budget mobo.

61%



Foxconn is the one of the largest component manufacturers in the world, but while its Quantum Force range of enthusiast motherboards are some of the best available, its standard range of motherboards often leaves something to be desired.

The unimaginatively (but at least clearly) named P34A is based on the Intel P43 chipset. Theoretically, this means that it shouldn't support 400MHz FSB CPUs, but like all the P43 motherboards in this Labs test, Foxconn has modified the BIOS so that it does. The P43 chipset is slightly cheaper than the P45 chipset, making the Foxconn P43A the cheapest LGA775 motherboard in this Labs test.

One of the better P43 motherboards, but it's no champion.

It's easy to see how Foxconn has managed to make this motherboard for such a low price. For starters, there's no RAID controller, which isn't a big deal at this end of the market, while the Northbridge, Southbridge and VRMs are cooled by very basic aluminium heatsinks. However, the P43A provides six SATA ports and 12 USB 2 ports. Although the P43A has two 16x PCI-E 2.0 slots, the second slot has only four lanes, which isn't fast enough for a second graphics card in CrossFire. The three PCI slots will be considerably more useful, leaving plenty of space for a sound card, WiFi and TV tuner, or other combination of expansion cards.

The P43A proved to be the slowest motherboard in this Labs test. The BIOS isn't very intuitive, as you can only increase the vcore, Northbridge and RAM voltages in increments of a fixed value, which are determined by the BIOS, and not the absolute voltage. As there are no other voltage options available and the BIOS doesn't auto-recover from a bad overclock, thus necessitating a CMOS clear, we could only increase the FSB to 415MHz without running into

## Foxconn P43A

Street Price \$124

Manufacturer [www.foxconnchannel.com](http://www.foxconnchannel.com)

stability problems. This is the same overclock as that of the Gigabyte GA-EP43-DS3LR which has a much more user-friendly BIOS.

Although the Foxconn P43A isn't a bad motherboard, the Intel P43 chipset leaves a lot to be desired. Unlike its forebear, the P31 chipset, which was eminently overclockable (to 470MHz or more), the P43 isn't a good overclocker. Given that you can pick up a far more capable P45-based motherboard for just \$20-odd more, buying a Foxconn P43A is a false economy.

Overall

While it isn't the worst, it certainly isn't the best.

64%



# msi



# Eclipse series

## Behold the Future of Computing

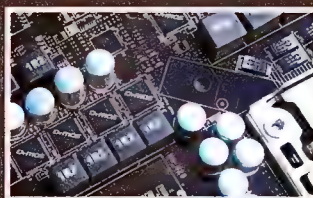
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## Foxconn P45A

One of the cheapest P45 motherboards available, but the BIOS leaves a lot to be desired.

Street Price \$147

Manufacturer [www.foxconnchannel.com](http://www.foxconnchannel.com)

The Foxconn P45A is almost identical to the P45A-S model. In fact, the only difference between the two is that the P45A-S supports RAID, while the P45A doesn't. This begs the question of why the P45A-S isn't called the P45A-R. Anyway...

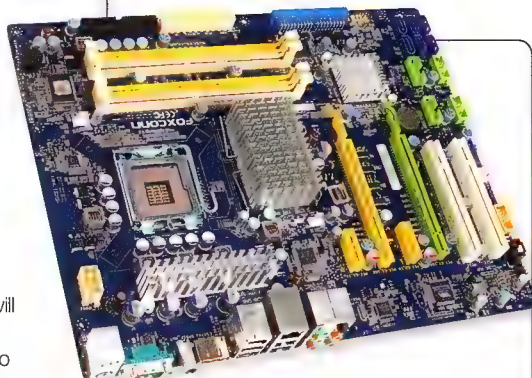
As linking together multiple hard disks in RAID 0 provides barely extra performance, and RAID 1 only makes sense when used for huge file servers, the lack of RAID support on the P45A isn't a show-stopping flaw. As the board is based on the P45 chipset, its two 16x PCI-E slots support CrossFire, although both will slow down to eight lanes when a pair of graphics cards is installed. The P45A also includes two 1x PCI-E slots, a pair of PCI slots, six SATA, a dozen USB 2 and two FireWire ports.

The PCB is considerably better laid out than that of the Asus P5Q, with all the I/O and power connectors hanging out towards

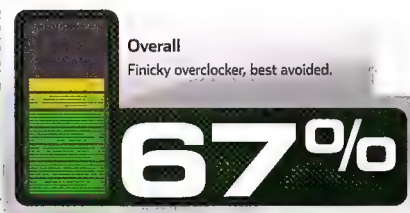
the edges of the board. Foxconn has thoughtfully positioned the single EIDE connector parallel with the PCB, which will make it easier to build a neatly wired PC. Although the aluminium heatsinks fitted to the Northbridge, Southbridge and VRMs are diminutive, they leave plenty of room around the CPU socket for large coolers.

The P45A scored very well in our benchmarks, but its BIOS is very restrictive and unintuitive. Instead of increasing the actual voltages of components, you have to increase the voltage in multiples of a fixed value. This means that unless you know the default voltage of every component, and have a calculator to hand, it's hard to adjust the voltages accurately. The BIOS is so hard to work that we struggled to make it benchmark stably with the FSB any higher than 420MHz – a terrible achievement for a motherboard costing close to \$150.

Although the P45A is slightly cheaper than the



Asus P5Q and supports CrossFire, its terrible BIOS and dire overclocking potential means that it's best left on the shelf.



Gigabyte appears to take perverse pleasure in thinking up incredibly long, cryptic names for its motherboards, and the GA-EP43-DS3LR is no exception.

Tucked away in the middle of its name is a clue to its origin – it's based on the Intel P43 chipset. Unlike the more expensive P45 chipset, the P43 chipset doesn't officially support 400MHz FSB CPUs, but Gigabyte has modified the BIOS so that it does. Although the P43 chipset supports CrossFire, it doesn't have enough PCI-E lanes to run it optimally, so Gigabyte has only fitted one 16x PCI-E slot to the GA-EP43-DS3LR. The rest of the PCB is filled out with four 1x PCI-E slots and a pair of PCI slots. Quite what Gigabyte

expects you to install in all those 1x PCI-E slots is a mystery to us, as the GA-EP43-DS3LR already has on-board LAN and audio. There are also six RAID-capable SATA ports used, plus a dozen USB 2 ports.

In its default configuration, the GA-EP43-DS3LR was one of the fastest LGA775 motherboards in this Labs test, scoring a very respectable 916 in our Media Benchmarks. The BIOS allows you to adjust the voltage of all the major buses and components, and is easy and straightforward to use. By raising the Northbridge to 1.4V, the FSB to 1.5V and the CPU PLL to 1.6V, we could benchmark the GA-EP43-DS3LR stably with a 415MHz FSB. However, the BIOS doesn't auto-recover from bad overclocks very well, necessitating a CMOS clear if you push it too far.

Although an FSB of 415MHz is a good overclock for a P43-based motherboard, the

## Gigabyte GA-EP43-DS3LR

Another P43 motherboard that fails to impress.

Street Price \$195

Manufacturer [www.giga-byte.com](http://www.giga-byte.com)

chipset leaves a lot to be desired. Unlike the previous generation of Intel chipsets, when the cut-down P31 was considerably cheaper than the fully-fledged P35, P43 is barely any cheaper than P45. As a result, the GA-EP43-DS3LR is only a few dollars cheaper than far more capable P45 motherboards such as the Biostar TP45 HP. As such, although this article is focused on finding the best low-cost components, we'd advise spending a little more and buying a P45 motherboard instead.





## ASUS P5Q

Much more overclockable than the P5QL-E, but it still isn't a good board.

Street Price \$135

Manufacturer [www.asus.com](http://www.asus.com)

The ASUS P5Q sits in the middle of a huge range of 23 other P5Q-branded ASUS motherboards, which makes us wonder about the precise difference between each model. In case anybody from ASUS is reading this, no, we don't want to see the other 22 models – it's full enough as it is.

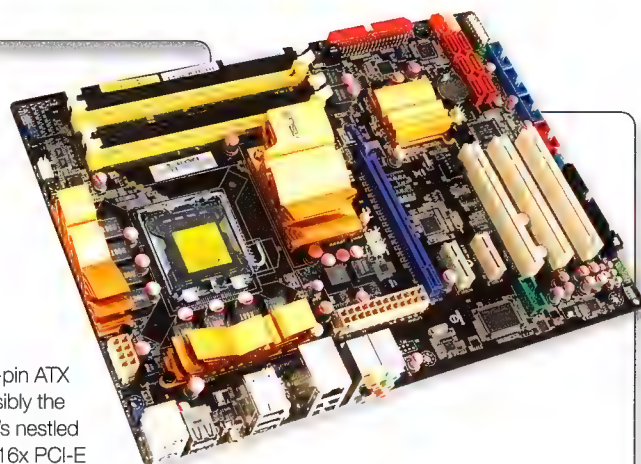
Unlike the P5QL-E, the P5Q is based on the Intel P45 chipset. This officially supports 400MHz FSB CPUs, which should help to make it a better overclocker than cheaper P43-based motherboards. Curiously, the P5Q has only one 16x PCI-E slot, even though the P45 chipset supports CrossFire. There are two 1x PCI-E slots and a trio of PCI slots. The Intel ICH10R Southbridge powers six RAID-capable SATA ports, plus a dozen USB 2 and a pair of FireWire ports.

These additions can't hide the fact that

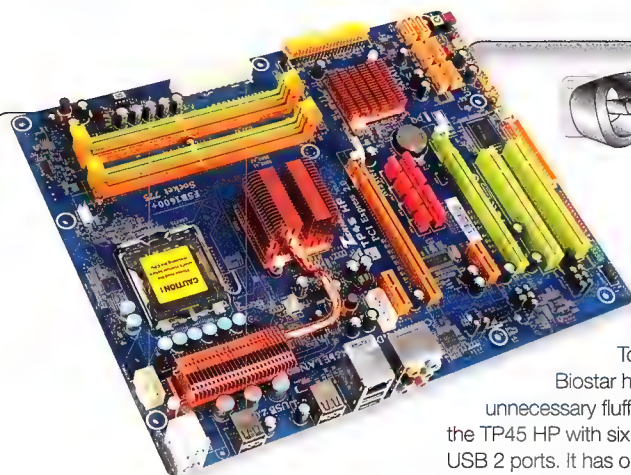
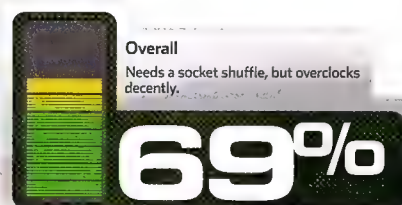
ASUS has positioned the 24-pin ATX power socket in what is possibly the worst position possible. As it's nestled next to the Northbridge and 16x PCI-E slot, its bulky cable will have to straddle the motherboard, restricting airflow around the CPU socket. The Northbridge, Southbridge and VRMs are fitted with distinctively shaped, copper-coloured aluminium heatsinks.

The P5Q redeemed itself in our benchmarks to some extent but, although it has a very comprehensive and easy-to-use BIOS, we couldn't benchmark it stably with the FSB any higher than 470MHz. This is a long way ahead of the P43 motherboards, but well short of the incredible 530MHz overclock achieved by the Biostar TP45HP.

The P5Q has a lot to prove. Unfortunately, although it's a good performer, it isn't a



particularly good overclocker. Taking the poor PCB layout into consideration, it's clear that the P5Q doesn't have what it takes to justify the price tag.



## Biostar TP45 HP

Amazingly overclockable – the best sub-\$200 motherboard.

Street Price NA

Manufacturer [www.biostar.com.tw](http://www.biostar.com.tw)

Biostar has had a good run of late, first producing the superlative TPower I45, and now this great design, the TP45 HP. It can be a bit hard to track down locally, but if you can find one, it's worth the trouble. eBay is good.

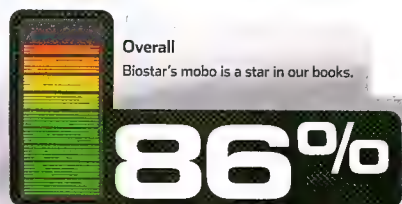
Like the TPower I45, the TP45 HP is based on the Intel P45 chipset, so it supports all current LGA775 CPUs. It also supports CrossFire, thanks to its two 16x PCI-E slots, which both slow down to eight lanes when a pair of graphics cards is installed. Biostar has thoughtfully placed these slots wide apart for better cooling of the graphics cards, and fitted a pair of 1x PCI-E and PCI slots.

To keep down the cost, Biostar has ditched lots of unnecessary fluff, such as RAID, leaving the TP45 HP with six SATA ports and a dozen USB 2 ports. It has on-board sound and Gigabit Ethernet though. The PCB is very sensibly laid out, with no major obstructions, while the heatpipe-linked heatsinks on the Northbridge and VRMs are a feature you usually only see on more expensive motherboards. The Southbridge is cooled by a solitary heatsink.

The TP45 HP proved to be a solid performer in our benchmarks, but really shone when we overclocked it. Unfortunately, Biostar still persists with its awkward BIOS system of increasing the voltage in increments rather than the absolute voltage. Even so, by increasing the Northbridge to 1.4V, the CPU PLL to 1.6V and the FSB to 1.625V, we could benchmark it stably with an FSB of 530MHz. This meant

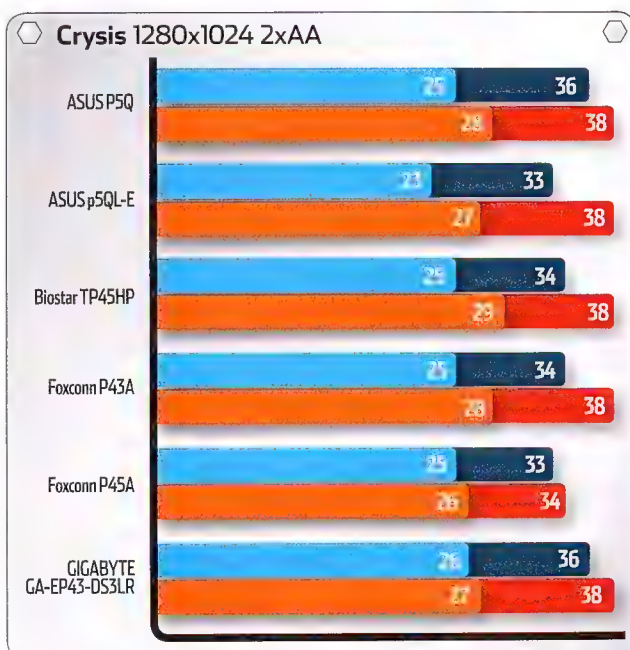
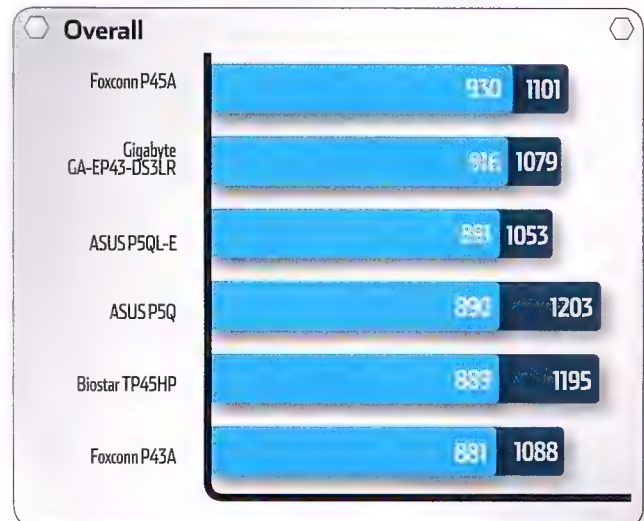
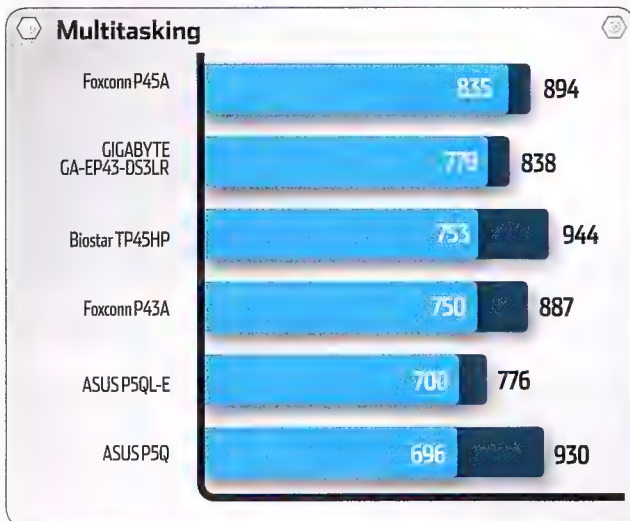
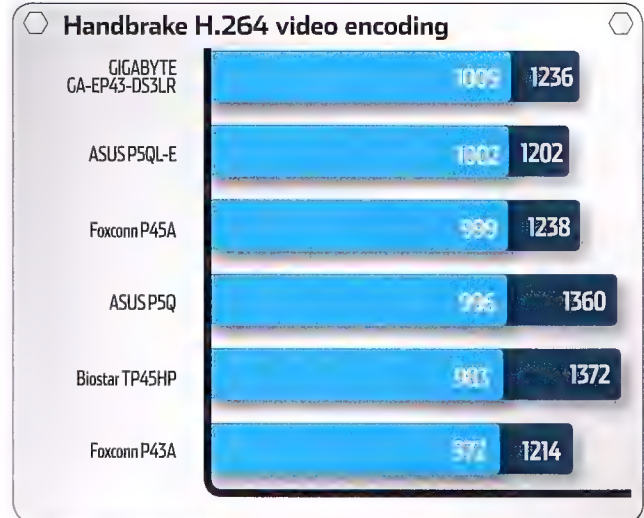
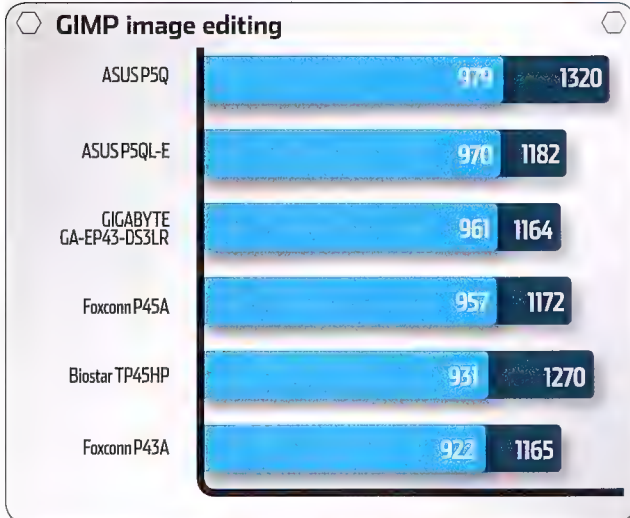
that it was also able to max out our test CPU, a Core 2 Duo E6750, to 3.66GHz with ease. At these settings, the TP45 HP returned record performance results in both our Media Benchmarks and Crysis.

As the Biostar TP45 HP is much more overclockable than any other motherboard in this Labs test, we have no hesitation in recommending it as the best starting point for a low-cost LGA775 PC, and well worth taking the trouble to hunt down.





Standard Overclocked



Min Avg O/C min O/C avg

Megahertz



## MSI KA790GX

The best board we've seen for overclocking Phenom, but it's a bittersweet ending.

**Street Price** \$200

**Manufacturer** [www.msicomputer.com](http://www.msicomputer.com)

The KA790GX is one of MSI's newer Socket AM2+ motherboards, and is based on the AMD 790GX chipset and SB750 Southbridge.

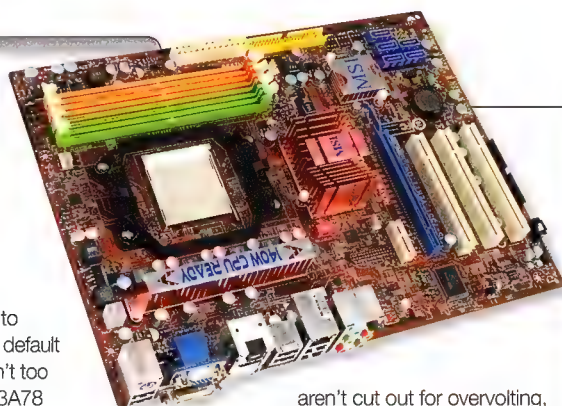
The board is equipped with ATI Radeon HD 3300 integrated graphics, five RAID-capable SATA ports and 8-channel Realtek ALC888 audio. While heatpipes are still rare on mid-range Socket AM2+ motherboards, the KA790GX has heatsinks on the chipset, Southbridge and VRMs. CrossFire is supported thanks to the two 16x PCI-E 2.0 slots. There are also three PCI slots, plus a single 1x PCI-E slot.

The KA790GX took second place in the Media Benchmarks at stock speeds and was no slouch in Crysis either, although the Foxconn A78AX-K and the Asus M3A78 Pro were both faster. We then started work on the BIOS to see how far we could push the KA790GX. While the BIOS is well laid out, it proved to be a little awkward to use; as

you can't set the voltage; you have to increase it in steps. If you know the default voltage for each setting then this isn't too much of an issue, but the ASUS M3A78 PRO BIOS is much easier to work with.

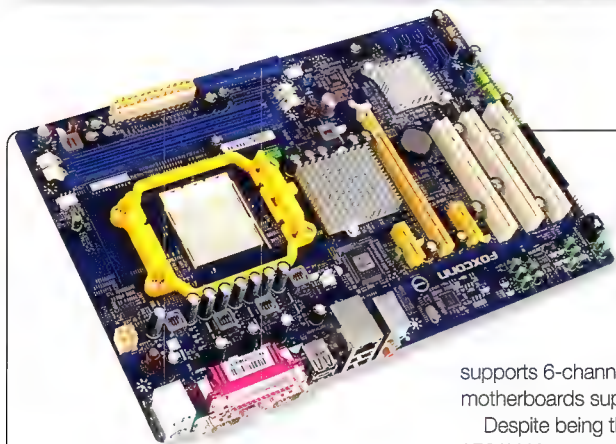
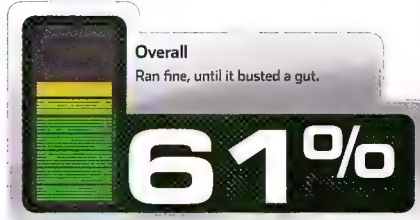
What happened next was nothing short of tragic. Greek tragedy tells of Agamemnon, King of Mycenae, who returned victorious after sacking the city of Troy only to be murdered by his adulterous wife Clytemnestra. A similar set of circumstances befell the KA790GX. It achieved an awesome HTT speed of 270MHz, the highest we've seen with a Socket AM2+ motherboard. Keen to see what it could achieve in our benchmarks, we left it running during lunchtime only to return a few minutes later to find the system had powered off.

While powering it back up, we were greeted by an ear-piercing crack and smell of burnt silicon as some component blew up on the KA790GX. It's clear that some of its components



aren't cut out for overvoltage, especially as the same voltages were used on other motherboards safely.

The KA790GX is the fifth Socket AM2+ motherboard to be blown up in recent months by an overvolted Phenom, but it's particularly disappointing in this case – until its demise, the KA790GX appeared to be a brilliant motherboard.



With a retail price \$50 lower than the nearest competitor, the Foxconn A78AX-K looks like a bargain. However, its specification is fairly basic compared with the other Socket AM2+ motherboards in this Labs test.

While it has six RAID-capable SATA ports, it lacks CrossFire support, as it has only one 16x PCI-E 2.0 slot. However, this means that there are a healthy number of PCI slots – three in total, along with a further two 1x PCI-E slots. DIMM sockets are also sparse, with just two available, so you'll need to ditch your existing memory when it's time to upgrade. The A78AX-K also uses the rather elderly Realtek ALC662 on-board sound, which only

supports 6-channel audio, whereas all the other motherboards support 8-channel audio.

Despite being the cheapest motherboard, the A78AX-K returned good results at its default settings. It managed an overall score of 881 in our Media Benchmarks and a minimum frame rate of 20fps in Crysis. Overclocking, however, was another story entirely.

First, we had to flash the BIOS with the latest version in order to adjust the multiplier on our Phenom X4 9850 test CPU. We then found that voltage adjustments are made by increasing the voltage by a certain amount of millivolts, which makes it a slow and stodgy process. Despite having some fairly high voltage limits, the maximum stable HTT speed we could elicit was 225MHz. This was achieved by raising the chipset and Southbridge voltages by 270mV. This isn't dire, but given that some other motherboards managed much higher

## Foxconn A78AX-K

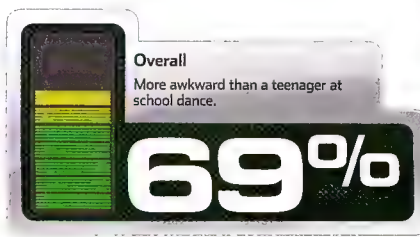
The cheapest Socket AM2+ motherboard on test, but it shows.

**Street Price** \$100

**Manufacturer** [www.foxconnchannel.com](http://www.foxconnchannel.com)

frequencies with the same amount of voltage, it doesn't inspire a lot of enthusiasm. Luckily, the A78AX-K could handle the Phenom X4 9850 Black Edition at its default 12.5 multiplier at this HTT speed, producing a clock speed of 2.81GHz. This resulted in an overall Media Benchmarks score of 997, which is second only to the Biostar TA790GX-A2+.

The limited and awkward overclockability of the A78AX-K makes it not worth buying.





## ASUS M3A78 PRO

Fast and cheap, but it's a poor overclocker.

Street Price \$157

Manufacturer [www.asus.com](http://www.asus.com)

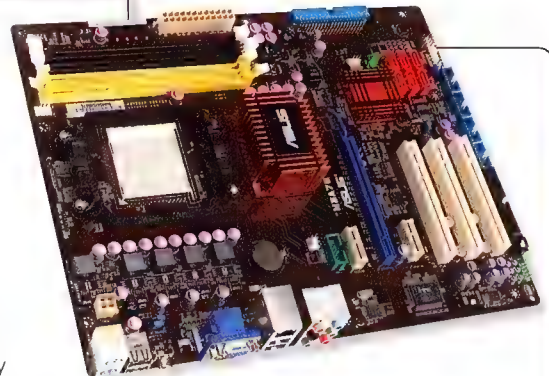
The ASUS M3A78 Pro is the third cheapest Socket AM2+ motherboard on test as we went to press. At first glance, it appears to be a viable option if you're building a new PC on a tight budget.

As it's based on the AMD 780G chipset, the M3A78 PRO has both on-board graphics and a single 16x PCI-E 2.0 slot. The integrated Radeon HD 3200 GPU is useless for gaming, but should be sufficient for a media PC. There are also three PCI slots, plus a pair of 1x PCI-E slots. The six RAID-capable SATA ports are more than enough for a budget PC, while the on-board 8-channel audio has both analogue outputs and a coaxial S/PDIF output. The PCB is well laid out too, although the VRMs are left to cool themselves with no dedicated heatsinks.

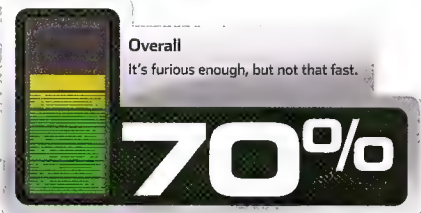
The M3A78 PRO recorded the best score in our Media Benchmarks (900 points), and managed a minimum frame rate of 20fps in Crysis, making this board and the Foxconn

A78AX-K the fastest boards on test. When we headed into the BIOS to overclock the M3A78 PRO, we were greeted with well laid out menus and a good array of overclocking options. However, the voltages on offer are very limited. For example, the maximum available vcore is just 1.3V, so it's impossible to achieve a big overclock.

We managed to overclock the HTT to 220MHz with the HTT voltage increased to 1.3V and the chipset to 1.4V – the smallest overclock of all the Socket AM2+ motherboards in this test. Due to the tiny vcore available, we could only increase the CPU frequency from 2.5GHz to 2.56GHz with an HTT speed of 205MHz at the default multiplier of 12.5. As a result, the overall Media Benchmarks score increased to just 941. Despite its poor overclocking credentials, the M3A78 PRO is at least polite – when you overclock it too far, it automatically recovers so that you don't have to clear the CMOS.



Despite its very low price and solid stock performance, the miniscule overclocking potential of the M3A78 PRO means that it isn't worth considering if you're building a new PC or looking for a new home for your Socket AM2+ processor.



## DFI Lanparty DK 790FX-M2RS

No longer the best Socket AM2+ motherboard, but ideal for a folding farm.

Street Price \$195

Manufacturer [www.dfi.com.tw](http://www.dfi.com.tw)

As its name suggests, the Lanparty DK 790FX-M2RS is based on the AMD 790FX chipset. This was the first high-end chipset for Socket AM+ processors and introduced support for multiple graphics cards in CrossFire. This particular board is fitted with three 16x PCI-E 2.0 slots, although the latter only provides four lanes. This isn't enough for gaming purposes, but it's sufficient to power a graphics card for Folding@home.

The AMD SB600 Southbridge provides four RAID-capable S-ATA II ports, while the 8-channel on-board audio has a full set of analogue and digital outputs. Unlike

many Socket AM2+ motherboards, the VRMs are cooled by a heatsink – an absolute necessity if you're going to overvolt a power-hungry Phenom. The Southbridge and chipset are also fitted with small heatsinks. Despite the three 16x PCI-E slots and three PCI slots, the PCB layout is very good. Highlights include the positioning of the S-ATA II and EIDE ports parallel with the PCB, and the location of the reset and power switches in the front left-hand corner.

While the Lanparty DK 790FX-M2RS's score of 830 in our Media Benchmarks is the slowest in this Labs test, the board is a reasonable overclocker. For example, it overclocked our Phenom X4 9850 from 2.5GHz to 2.8GHz, and by raising the Southbridge to 1.3V and chipset to 1.37V, it was able to run our benchmarks stably at a 235MHz HTT.

Although the Lanparty DK 790FX-M2RS was considered to be a good overclocker six months ago, several other motherboards reviewed this issue raced past it. Given its comparatively low performance without overclocking, we can't really recommend it for most people. However, its three widely spaced 16x PCI-E slots and low price make it a good choice for those after a decently performing gaming rig.





## GIGABYTE GA-MA790X-DS4

One of the best Socket AM2+ motherboards to date.

Street Price \$285

Manufacturer [www.giga-byte.com](http://www.giga-byte.com)

Unlike many of the Socket AM2+ motherboards in this Labs test, the GA-MA790X-DS4 isn't burdened with on-board graphics. While many integrated GPUs are up to the job of powering a media PC, no manufacturer has been able to produce one that can handle modern games.

Now that ATI has released a plethora of competitive Radeon HD 4000-series GPUs, the two 16x PCI-E 2.0 slots of the GA-MA790X-DS4 are a welcome inclusion. The slots are separated by a pair of 1x PCI-E slots, with a third 1x PCI-E slot lurking near the CPU socket and two PCI slots situated on the far left-hand side of the PCB. Unfortunately, Gigabyte has chosen to locate the 8-pin EPS12V power socket for the CPU adjacent to the chipset and right-hand 1x PCI-E slot, so its bulky power cable will have to straddle the motherboard, thereby restricting airflow. Otherwise, the GA-MA790X-DS4 is reasonably if rather

conservatively laid out.

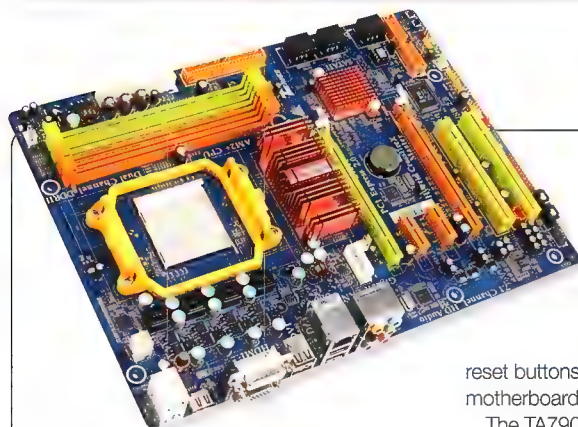
GIGABYTE usually floods its motherboards with dozens of I/O ports, but the GA-MA790X-DS4 has a sensible mix of four RAID-capable SATA ports and ten USB 2 ports. Unusually for a cheap motherboard, the 8-channel on-board audio is equipped with both optical and coaxial S/PDIF outputs. While the chipset and Southbridge are fitted with small heatsinks, the VRMs are exposed to the elements.

The GA-MA790X-DS4's score of 845 in our Media Benchmarks was one of the slower results in this Labs test. However, when it came to overclocking, the comprehensive and user-friendly BIOS allowed the GA-MA790X-DS4 to redeem itself. After raising the chipset voltage to 1.45V and the Southbridge to 1.35V, it could overclock our Phenom X4 9850 CPU from 2.5GHz to 2.88GHz. Using these voltages, but dropping the CPU multiplier, it would



benchmark stably with an HTT of 240MHz, one of the better results in this Labs test.

While the GA-MA790X-DS4 is one of better overclocking Socket AM2+ motherboards, it takes second place to the superior overclocking, better laid out and cheaper Biostar TA790GX-A2+.



Biostar has been making waves with its LGA775 motherboards. We were expecting more of the same from this Socket AM2+ motherboard and the Biostar TA790GX-A2+ didn't disappoint.

It's well equipped, sporting AMD's 790GX chipset, ATI Radeon HD 3300 integrated graphics and 8-channel audio support thanks to a Realtek ALC888 chip. It also has six RAID-capable SATA ports and supports CrossFire with two 16x PCI-E 2.0 slots, although the second slot only provides eight lanes in CrossFire mode. As a result of having two 16x PCI-E 2.0 slots, there are only two PCI slots, although there are two 1x PCI-E slots. There are also on-board power and

reset buttons to aid overclocking when the motherboard isn't installed in a case.

The TA790GX-A2+ didn't perform particularly well at first, scoring 860 in our Media Benchmarks. It was also pretty poor in Crysis, with a minimum frame rate of just 16fps – well below the 20fps achieved by the ASUS M3A78 PRO and Foxconn A78AX-K. The BIOS isn't as intuitive as those of the ASUS and GIGABYTE motherboards either, as you increase the voltage, rather than setting it directly. However, there's a wide range of voltage adjustments.

By lowering our test CPU's multiplier to 4, we could raise the HTT to 240MHz with the chipset voltage increased to 1.45V and the Southbridge to 1.35V. However, with the multiplier at the default 12.5, we had to reduce the HTT to 230MHz. This overclocked the CPU from 2.5GHz to 2.88GHz, which resulted in a Media Benchmarks score of 1,003 – the fastest of all

## Biostar TA790GX-A2+

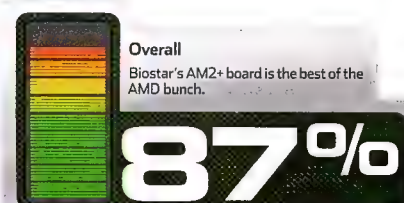
A clunky BIOS, but it's a good overclocker and well laid out.



Street Price \$149  
Manufacturer [www.biostar.com.tw](http://www.biostar.com.tw)

the Socket AM2+ motherboards. This also provided a significant boost in Crysis, with the minimum frame rate increasing from 16fps to 22fps. With no heatsinks on the VRMs, however, the PCB around the CPU socket became rather hot while benchmarking, so you'll need to have good case cooling if you want to increase the any of the voltages.

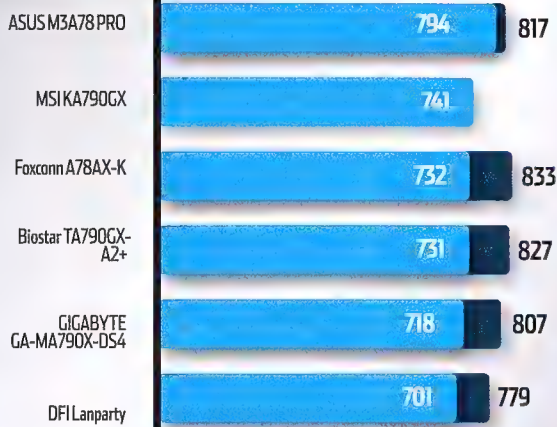
Despite this limitation, with a price tag of \$149, this mobo is an excellent choice.





Standard Overclocked

## GIMP image editing



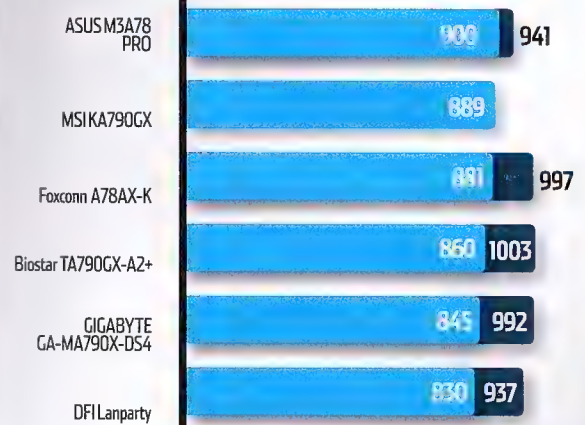
## Handbrake H.264 video encoding



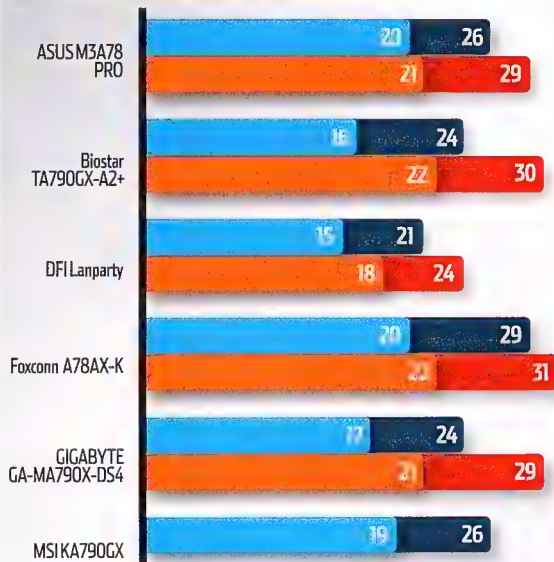
## Multitasking



## Overall



## Crysis 1280x1024 2xAA



## Maximum Stable FSB



Min Avg O/C min O/C avg

Megahertz





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# From aerial torpedoes to RoboCars



**Daniel Rutter rides shotgun for robots...**

**C**ombat robots were science fiction until, suddenly, they started showing up on the evening news. Now people in Iraq and Afghanistan are getting missiles shot at them by things that're actually called 'Predators' and 'Reapers'.

We haven't quite made it to the Terminator/Cylon/Tachikoma stage yet, of course. It's more pilotless planes (Unmanned Aerial Vehicles, or UAVs), and pilotless planes with guns (Unmanned Combat Aerial Vehicles, UCAVs). We're making serious inroads on the much more difficult problem of autonomous ground vehicles, too. Those were completely out of the question in the early days of UAVs, way back in World War I.

Unmanned Ground Vehicles still seemed pretty hopeless when the world first got to see a bunch of them in one place, at the 2004 DARPA Grand Challenge. That race had 15 starters, but zero finishers.

The very next year, though, five of 23 starters made it to the end, and only one didn't get as far as the best competitor from the year before.

The next challenge was held in 2007, in an urban environment including other traffic instead of the back-country of the previous races. The final race was roughly as difficult as any ten really annoying Grand Theft Auto missions put together, but it still had six finishers from eleven starters.

On the military side, 'smart' vehicles and munitions are yet another force multiplier.

If, you see, someone drives a Camry over you tomorrow, you (or your next of kin) are unlikely to sue Toyota. But even if the motor-accident rate for driverless cars is one per cent of the regular-car rate, people who get hit by a RoboCamry – and, heck, maybe also the people who're sitting in it when it hits someone – will sue Toyota.

I've got the solution, though. Military customers seem to be pretty happy with anything that can launch missiles, even if the rest of the vehicle doesn't work very well. So the New 2015 RoboCamry just has to come with Three Free Hellfires!

Okay, that might cut into the road-toll improvement a little. But you can't say it wouldn't make driving exciting again.

**The easier technology makes it to achieve a military objective, the more likely someone is to try it.**

UAVs then, steered by gyro stabilised autopilots, were called 'aerial torpedoes'. They didn't make a great impact on the military world, or the enemy. But their introduction gave rise to every 'smart' weapon.

Aerial torpedoes were, in fact, primitive cruise missiles. A modern cruise missile can independently fly a complex course of more than 2,000 kilometres at little more than treetop height. That sounds like a pretty impressive UAV to me, even though it's not the kind that needs landing gear.

The nice thing about the sky is that there's not much to run into, so a cruise missile that has very close to no brains at all, like the WWII V-1 flying bombs, can be effective. Land vehicles have to be able to tell the difference between a shadow, a bush and a rock, though, and you can't do that with clockwork and gyroscopes.

Precision weapons do make it easier to kill enemies hiding among civilians without as much 'collateral damage', and robot planes and tanks do let you keep your own soldiers out of harm's way. But the result of new force multipliers never actually seems to be less war. The easier technology makes it to achieve a military objective, the more likely someone is to try it.

But the civilian version of a UGV is the driverless car, and – as I've written before – the world's yearly road toll is in the order of a million deaths. People are not good at driving cars. Robot cars can't come soon enough, if you ask me.

The only thing that depresses me about the robot-car future is the substantial legal, not technological, obstacles in their way. A big part of that is making it legal to actually put robot cars on the road, but there's something else waiting when they get there.

Dan Rutter welcomes our new automaton overlords.  
[dan@atomicmpc.com.au](mailto:dan@atomicmpc.com.au)



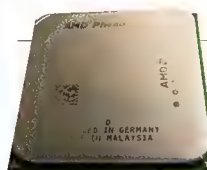


# KITLOG

There's nothing sexier than new kit. And whether you need to hoard your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and a collection of sports cars (Extreme), we're here to help with this handy matrix of Atomic recommended products. You may find your needs fall between categories – that's okay, just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in Atomic, so if you want to learn more, look up the issue and page number listed.

## BUDGET

CPU



### AMD Phenom X4 9550

PRICE \$200

A well performing Quad core for those on a budget, that won't break the bank and doesn't get too hot.

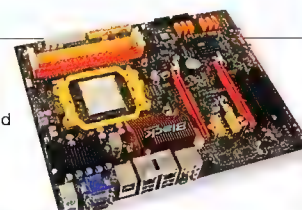
MOTHERBOARD

### ECS A790GXM-A

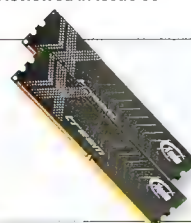
PRICE \$200

Nothing says cool like a black mobo, and this one will satisfy your overclocking needs too.

*Reviewed in Issue 99*



MEMORY



### TEAM Xtrem Dark PC2-6400 C4

PRICE \$60

These modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.

*Reviewed in Issue 80 – Page 56*

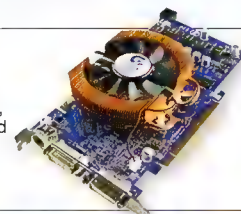
VIDEOCARD

### GeForce 9800GT 512MB

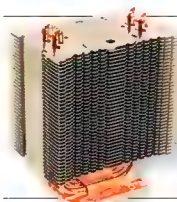
PRICE \$170

A 55nm card that remains very cool and fast, with plenty of headroom for overclocking and a price that speaks volumes about it's value. Great performance too.

*Reviewed in Issue 92 – Page 49*



COOLER



### Noctua NH-U9B

PRICE \$72

Labs tested to be the top of the cooling game without breaking the bank (or making you sweat – haha)

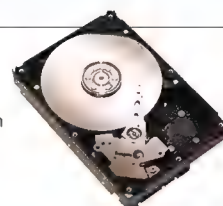
*Reviewed in Issue 89 – Page 36*

SYSTEMDRIVE

### 640GB HDD

PRICE \$110

The absolute best value for money, with two 320GB platters giving great speed and low latency.



DISPLAY



### AOC 2216Vw

PRICE \$240

A great 22" widescreen for any purpose, with accurate colour reproduction and a bloody good price.

*Reviewed in Issue 94 – Page 42*

SPEAKERS

### Steelcase 5Hv2

PRICE \$120

Great gaming headphones with inbuilt mic, but music quality falls short.

*Reviewed in Issue 73 – Page 43*



CASE



### Cooler Master CM690

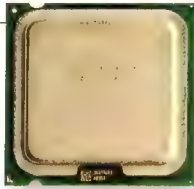
PRICE \$100

A sturdy, spacious case with plenty of airflow and more than enough room for the biggest of systems. Some stores even have a windowed version!

*Reviewed in Issue 84 – Page 51*



## PERFORMANCE



### Intel Core 2 Duo E8400

PRICE \$270

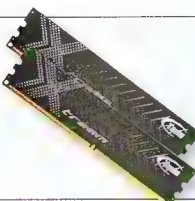
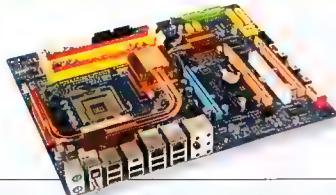
A processing powerhouse, now affordable and overclockable like buggery.

### GIGABYTE EP45-DS4P

PRICE \$200

A P45-based mobo with a bevy of features and a good overclocking potential.

*Reviewed in Issue 93 – Page 55*



### TEAM Xtrem Dark PC2-6400 C4

PRICE \$60

Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.

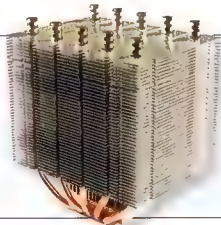
*Reviewed in Issue 80 – Page 56*

### Sapphire HD4870

PRICE \$350

One of the best price to performance cards on the market. Welcome back Red!

*Reviewed in Issue 92 – Page 36*



### Scythe Mugen 2

PRICE \$84

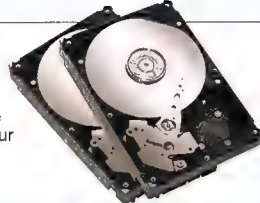
The Mugen 2 performs almost as well as the TRUE, but has a fan included and is even a little cheaper!

*Reviewed in Issue 100 – Page 42*

### 640GB HDD - Times two!

PRICE \$110x2

All the speed of dense platters, with the peace of mind to be able to back up your precious files.



### LG W2252TQ

PRICE \$270

You'll pay a little more for this 22" screen, but the colours are amazing, with no backlight bleed and no ghosting.

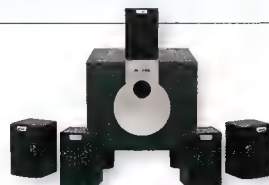
*Reviewed in Issue 94*

### AVLabs AVL325

PRICE \$210

Slightly aged speakers now, but these still offer a great 5.1 sound experience - if you can find a set.

*Reviewed in Issue 64 – Page 50*



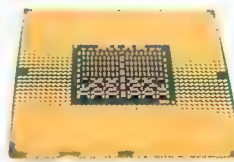
### Cooler Master HAF 932

PRICE \$230

A massive case with three 230mm fans that can move enough air to qualify as a small aeroplane. And quiet to boot.

*Reviewed in Issue 93 – Page 48*

## EXTREME



### Intel Core i7 965

PRICE: \$1750

Intel's latest and greatest chip, complete with an unlocked multi, 45nm process, and a massive pricetag. Good for what ails you.

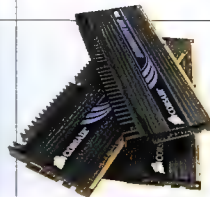
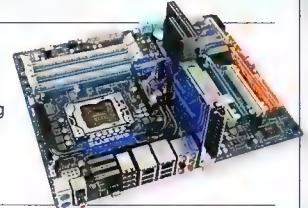
*Reviewed in Issue 95 – Page 38*

### GIGABYTE EX58-EXTREME

PRICE \$520

GIGABYTE has had the best overclocking board thus far, and therefore the perfect mobo for a beastly rig.

*Reviewed in Issue 96 – Page 38*



### Corsair Dominator TR3X6G1600C8D

PRICE \$515

Nothing says memory bandwidth like a triple channel kit of speed, yet imposing RAM - a whole 6GB of it!

*Reviewed in Issue 96 – Page 41*

### NVIDIA GTX295x2

PRICE \$830 x2

NVIDIA catapulted themselves back to the top with this dual-GPU sandwich. Grab two of them in SLI for four-way madness!

*Reviewed in Issue 98 – page 41*



### Thermalright Ultra 120 Extreme

PRICE \$85

The current best air cooling - just make sure you grab a LGA1366 mounting kit to use it!

*Reviewed in Issue 89 – Page 33*

### Intel 80GB SSD

PRICE \$760

Blindingly fast, effortlessly quick, and utterly silent. Grab a normal HDD for storage, but games and OS need to live here.

*Reviewed in Issue 94 – Page 50*



### Dell 3008 WFP

PRICE \$2299

It's enough to make a grown man weep and beg. Or, at least, that's what we'd do for one of these simply gorgeous displays.

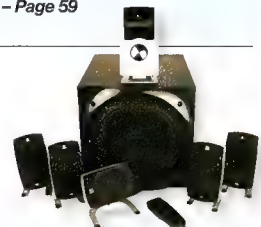
*Reviewed in Issue 88 – Page 59*

### Logitech Z-5500D

PRICE \$419

Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike.

*Reviewed in Issue 48 – Page 56*



### Lian Li X-2000

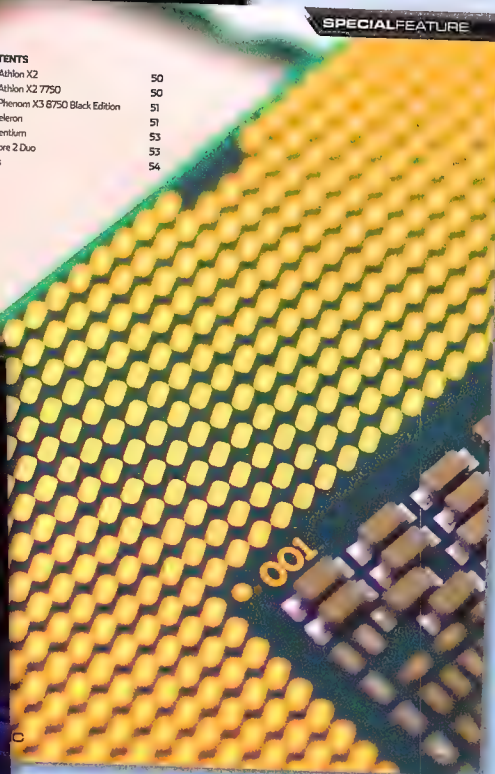
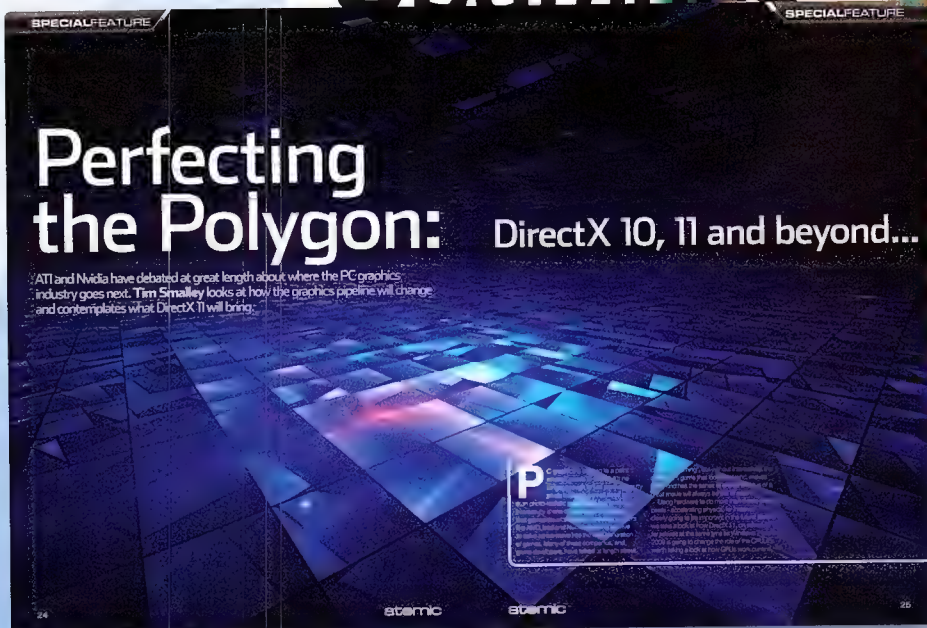
PRICE \$740

The only case we've had in that has made the editor orgasmically happy, and is drenched with quality in every one of its brushed aluminium panels. Definitely a case to show off your system-building prowess!

*Reviewed in Issue 91 – Page 54*



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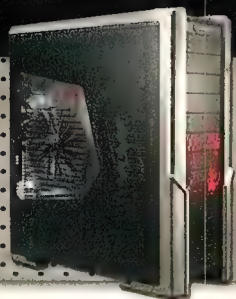
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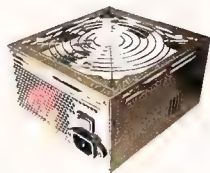
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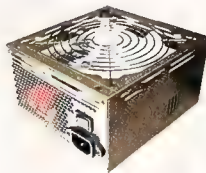
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1200 Watt PSU

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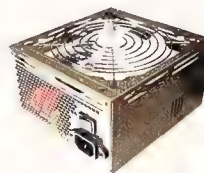
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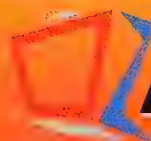
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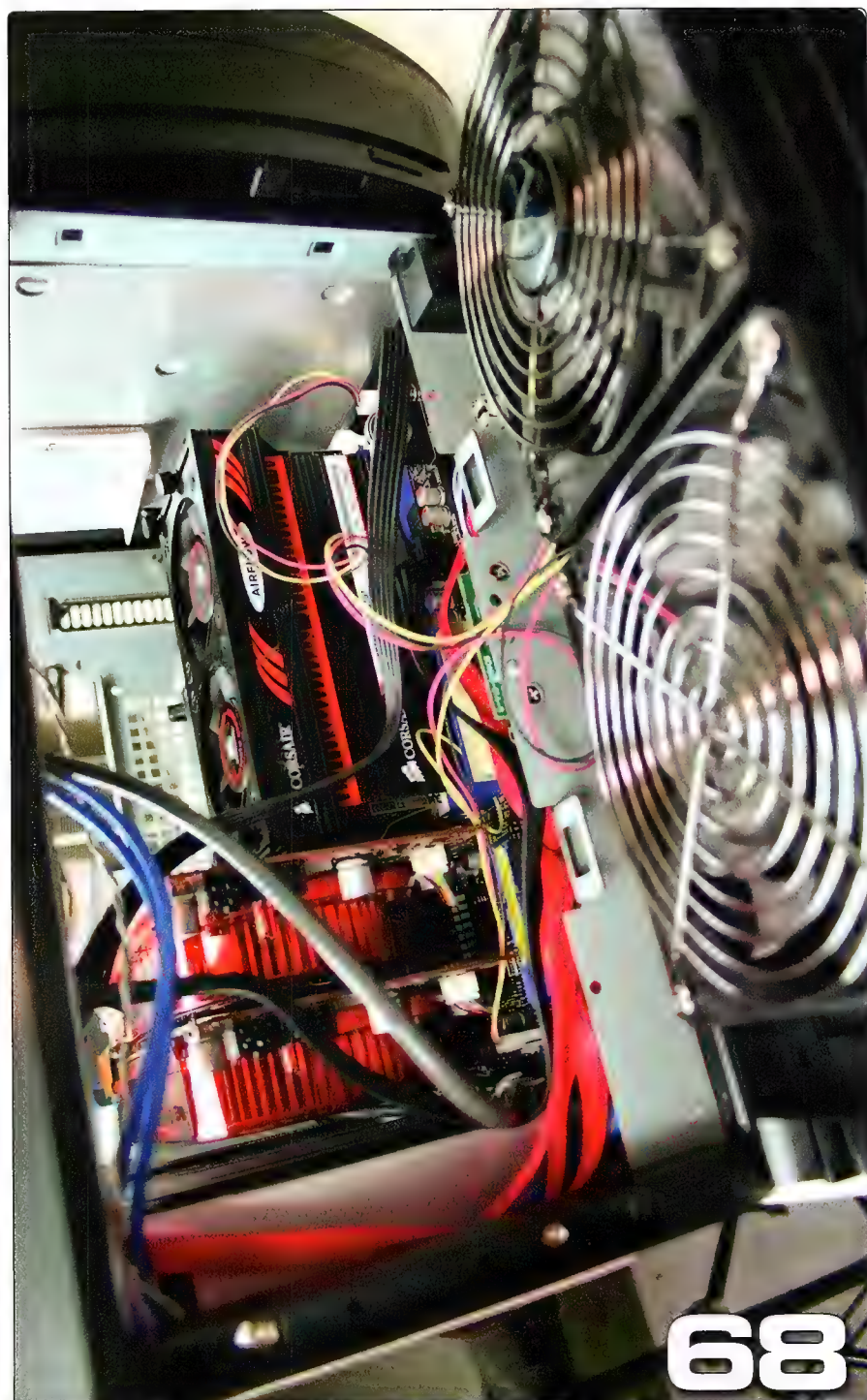


# TUTORIAL

## HANDS-ON TUTORIALS FOR THE TECHNICALLY MINDED

This month's tutorial section is jam-packed with some of the more exciting things we've done for a while! Starting off with six glorious pages of portable PC loving, Justin Robinson throws together a surprisingly miniature build with maximum performance. Right after that we've got a tute for brushing aluminium to get an exceptional pro finish.

Chris Taylor returns for our education section to take us through how to get your head around studying overseas, while Zara Baxter explains just why statistics can throw you off your game using bears and tea. There's a lot to get into, so grab a drink and immerse yourself in awesomeness.



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Zara Baxter debunks bad uses of statistics.	







# The ultimate LAN build

Justin Robinson packs more points per cubic inch than ever before.

A notification pops up in your IRC chat; "OMG, wanna LAN this weekend?!?!", but you've got a big clunky case so huge that it's probably more akin to an ammo crate than a serious portable rig. You gingerly pick it up, struggling with the bulk as you heft it to the car, awkwardly moving your boot around to fit it in, and repeating the process every time you feel the burning desire for some social gaming. You won't have to live this

way for too long, though – Atomic is here to help!

We've taken the beefiest components available on the market today, the slickest bunch of performance wares and a whole lot of effort to put together *the most powerful* easily portable build ever. With the best parts, planning and patience a rig like this can easily be yours; but as we'll see in the coming pages it isn't the easiest choice by any sense of the word.

## Tech specs at a glance

- Intel Core i7 965 @ 3.2GHz - \$1660
- Corsair Dominator 1866 CL7 - \$440
- ASUS Rampage II Gene mATX - \$480
- XFX 4890 XXX - \$410
- GIGABYTE 4890 - \$408
- SilverStone SG04 mATX - \$215
- Corsair HX1000 PSU - \$390
- Intel 80GB SSD - \$680
- Western Digital Velociraptor 300GB - \$380
- Seagate Barracuda 7200.12 1TB - \$189
- ASUS DVD/RW Drive - \$30
- 2x Scythe Gentle Typhoon Fans - \$50
- 1x Noctua fan - \$25
- 1x SilverStone fan - Included with case

Total cost: **\$5357**

## Picking the Parts

Before you start any build, the very first thing to do is decide exactly what you want the final result to be able to do for you. Servers, hardcore render farms or simply video encoding boxes are all pretty simple, but we're after a different beast – the portable kind. We define portable as not just being easy (relatively) to carry around, but also being small in size while packing in as much (or in our case more) grunt than your average full-sized rig.

Keeping that in mind, our first and most obvious choice was a MicroATX-based build. We nabbed the ASUS Rampage II Gene board from the review on page 34, and thanks to its huge amount of expansion options this left us with a great start. Since it's an X58-based board, an Intel Nehalem chip was the sensible choice; the 965's







## A very precise and complicated plan

Laying out all the parts on the Labs bench, attentions were first focused on the case. While it's certainly pretty, we figured it needed just a little more functionality too, and whipped out the Dremel. Before cutting, all sidepanels and removable pieces of the case, like the handle, were uninstalled and placed to one side (make sure you hang on to screws, as they're in varied sizes). The Gene II comes with a small LCD screen, which we easily pulled apart with a screwdriver, then gently Dremeled out some plastic to remove the cable from the plastic housing.

Once the screen was freed from the housing, we measured a distance twice the width of the screen from the edge of the case, and marked it out lightly in pencil. We'd checked there was clearance on the underside of the case – it fit just above the DVD drive. Attaching the cutting piece to the Dremel, we cut it out from the inside of the markings; you can always widen a hole, but you can't easily refill it if you take too much off. An old screwdriver was used as a makeshift paintbrush as we applied silicon sealant to the edges of the screen, and finally pressed it firmly against the top of the case from the inside. Note the small mark underneath – this is where I sneezed and damaged the finish. Make sure you take it incredibly carefully. Once the screen is mounted, leave it to one side to set, as we get to work with the rest of

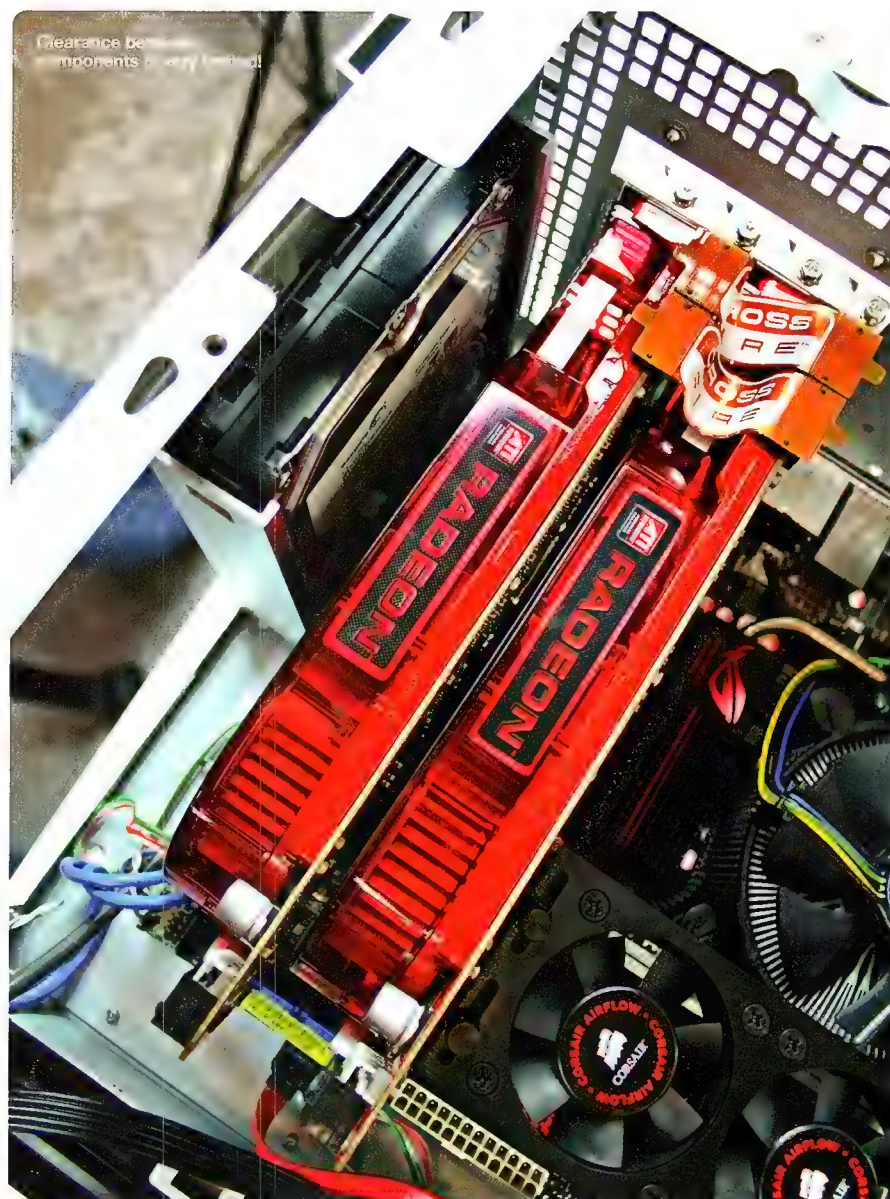
stock speed of 3.2GHz offers a huge amount of performance. DDR3 memory isn't such a hard choice, but we still got some very fast Corsair Dominator sticks complete with the airflow fan.

We decided early on to pack dual graphics cards into this rig, so we also chose the XFX 4890 and GIGABYTE 4890 for their great performance and decent cooling. Storage was another issue, and we grabbed a speedy Intel

80GB SSD for the OS, a still-fast WD 300GB Velociraptor for games, and a Seagate 1TB HDD for media and data. Picking all this tech, the next step was to find a case that fit it all – we chose the SilverStone SG04 case: mATX compatible, claims Crossfire/SLI compatibility and has a sturdy handle on the top. Finally, we chose an incredibly beefy and reliable Corsair 1000HX PSU to power the rig no matter what we threw its way.







the tech. Make sure you've removed all the metal dust from inside the case, and reinstall the handle on top.

## Preparing the subject

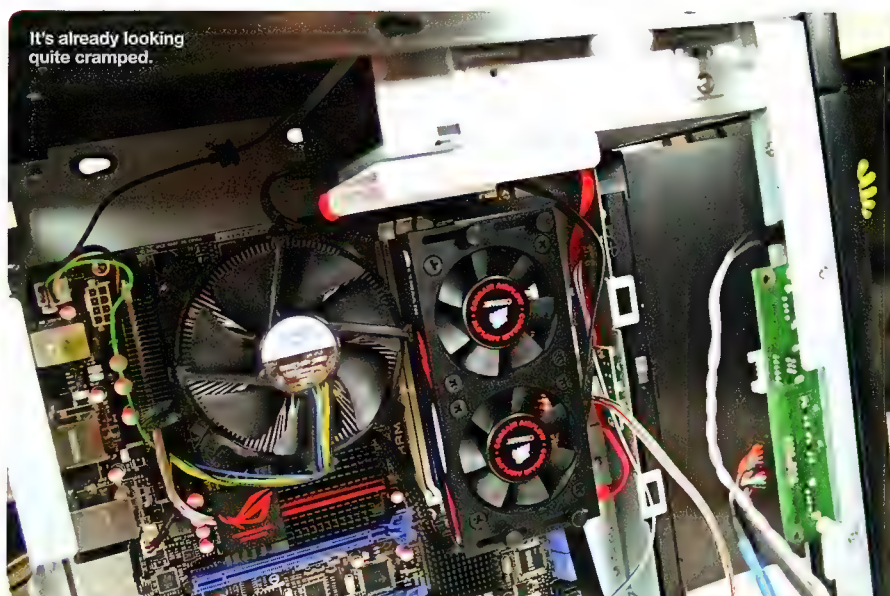
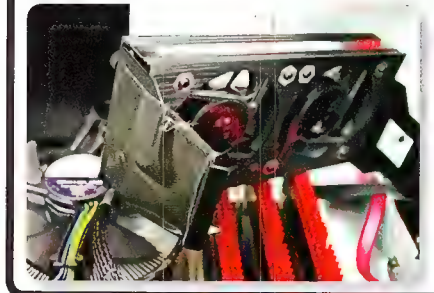
Keeping in mind the huge amount of tech, and therefore heat that this rig will make, we're going to need some airflow to keep things stable. Removing the stock 120mm fan from the front holster, we installed two Scythe Gentle Typhoon fans that push a significant amount of airflow; each fan was treated to a grille to prevent cables slipping between the blades. The short cables used with these fans actually benefit us here, meaning less clutter and an easier install.

The floor of the case detaches as two separate pieces, each of which will hold a single HDD. We attached the plastic rails to each drive, and slotted them into each floor segment, but put them aside for later. Then we installed the SSD, with screws, into the side bracket of the case; this will be the very last item to be installed. Our aim is to get as much installed and done outside in the free air before getting in to the case, as well as giving it some time for the screen to finish setting. As most experienced builders know, this is a good strategy either way. With that in mind, we got started on the motherboard.

The CPU was installed as per normal, and had the stock reference cooler installed over it. We're sticking with stock due to the limited amount of

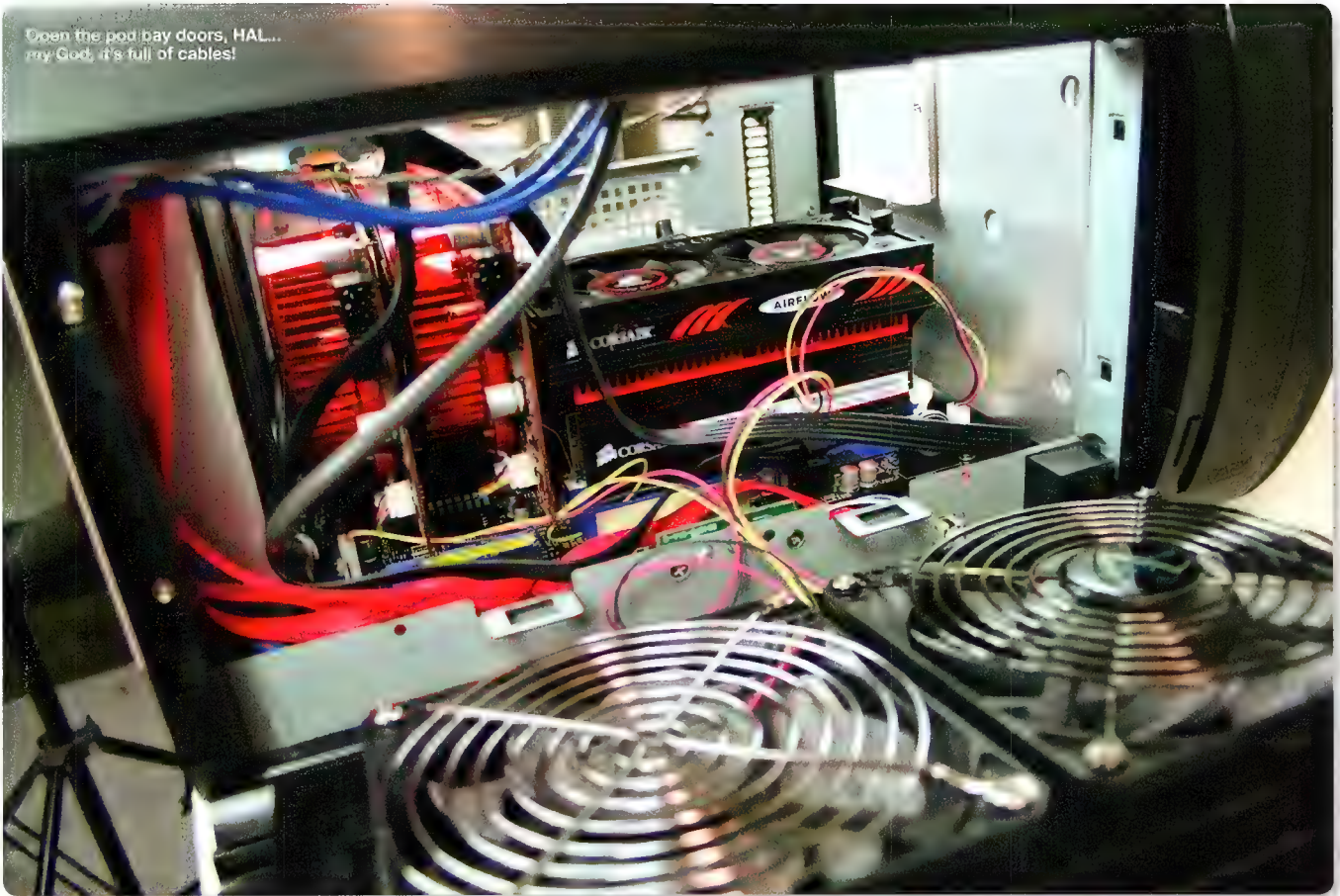
## ZZZZZAP!

A major problem when playing with electronics in such a cramped space is the risk of components shorting out, a problem exacerbated when you put a metal-framed fan array right against the back of a graphics card. A simple length of cloth tape or similar to insulate the two is all that's needed here, but it's something to keep in mind for any expensive bits of tech you have that you don't want to lose.





Open the pod bay doors, HAL...  
My God, it's full of cables!



space that is going to be available in the case. Corsair's Dominator sticks were also installed, and had the fan array stuck over them for the same reason – limited space will demand a lot more focused cooling than usual. Fan cables were threaded through the heatpipes on the cooling array of the northbridge, ensuring that they're kept out of the way later. Orienting both the CPU cooler and fan array to have the cables pointing down the board makes cabling easier, and having just the right amount of length to the fan headers is important to keep out of the way of other components.

Having waited long enough for the LCD to set, the next step was to install the DVD drive by simply sliding it in through the front of the case, and securing it with the included drive screws. An adhesive strip was included with the case, which is placed on the tray of the drive (the black strip that moves when you eject discs), and an aluminium plate pressed on top. This essentially stealths the presence of a drive, and keeps the sleek look of the case intact.

We're still not finished with preparations, as the next step is to remove the FireWire cable from the small PCB inside the case – we don't use it at all, and it's a thick cable that doesn't need to be there. Removing the small expansion slot cover, all four PCI brackets were removed and placed aside while keeping the screws; they too will be needed later. After looking at the motherboard screw layout, eight standoffs were installed into the motherboard tray of the case. We're finally ready to move ahead.



## Surveying the installation

If this were a baking show, the host in the cheesy jumper would grab the prepared mobo (complete with heatsink and RAM), and announce it was one prepared earlier. It's not – but the process is the same. Grab the board with installed components, and lower it into the case that you've lain down horizontally. Make sure you've preinstalled the I/O shield on the back of the case, and use

all eight screws to secure the mobo to the case. Now we've a motherboard and a DVD drive installed, cable up the front panel headers and USB cables, tucking excess behind the motherboard if you can and otherwise bunching them up neatly in the corner – cable ties are great for this. Avoid getting them in the way of the fan mount, or the hard drives, since we'll need to reinstall those later.

Take a single SATA cable, as well as a modular SATA power cable and thread them from the DVD drive to the motherboard, leaving the end of



the power cable loose. Modular PSUs make this much easier; just cable all to the one area and connect them when ready. Keep the SATA cable as flush to the motherboard tray as possible, as this won't be the only one to take this route. Now plug in the LCD screen.

Just before we get to the drives, we'll need to lower the two 4890s in from the top, settling them in each PCIe X16 slot and screwing them in. There was a bit of warping in the case, but a simple hand on the cards kept them in the correct place long enough to secure them. Chuck the two CrossFire cables between the CrossFire nips of each card to activate the link, and make sure the cables are not caught in fans. There isn't a lot of room in here, and it's only going to get worse as we move along.

Once everything is clear, take each harddrive caddy and reinstall them in the floor of the case. The left-hand one should be easy and unimpeded; but the right-hand will require some cable manoeuvring to get it in solidly. If you can see the amount of space between the hard drives and the cards in the pic on this page you'll get some kind of idea about how space is at a premium here – and we haven't even finished!

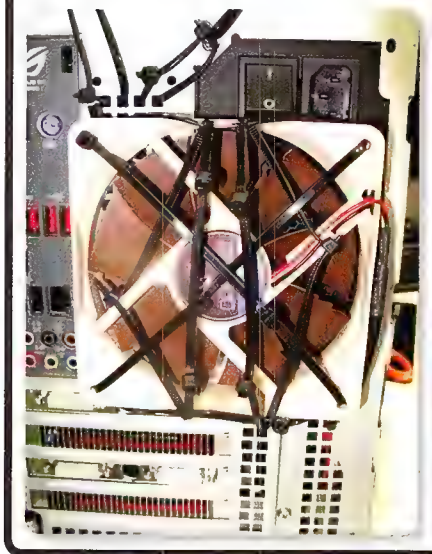
We've got our hard drives installed, so the next step is to run SATA data cables from them to the motherboard. Make sure you run one additional cable for the SSD, leaving it with the two HDD ones. Again the aim here is to keep them as much out of the way as possible, so snake them

Doesn't get much tighter than this.



## Thermal Problems

Heat is computing's biggest enemy, and in such a small space it's hard to combat. We got around this by cable-tying the stock 120mm fan just above the CPU, securing it through the expansion slot. We added an external Noctua 120mm fan that covers the exhaust of the PSU and the CPU, providing a lot of airflow. This was cabled through the ventilation holes (disassembling the 3-pin header and reassembling it inside the case), and cable tied – along with a custom cable-tie fan-guard to keep fingers out.



alongside the wall of the case and along the tops of the drives, down their length and into the mobo. Take one of the 4-connector SATA power cables from the PSU, and connect up the drives with the first and third connector; leave the fourth spare for the SSD we're installing later on. While the SATA cables included with the mobo have some right-angle connectors, use the straight ones for the two HDDs – otherwise they won't be secure against the walls of the case.

## Cabling nightmare

If you think the cabling until this point has been tricky, we suggest you give up now and buy a standard ATX case – from here on it gets to the point of mind-bending lunacy. The best way I can describe it is if you were trying to perform open-heart surgery on a midget, using only a blunt toothpick, while suspended upside down over a tank full of piranhas. Ah, perhaps not best, but in terms of difficulty you won't find much trickier.

Take the fan array and place it near where it usually resides but don't install it. Grab each 3-pin fan cable and twist one end, causing the cables to tighten and remain in a bunch, keeping

them away from fan blades. The top fan is easy to reach; but the bottom slots in underneath a graphics card, and is tricky to get in. Grab two modular PCIe power cables, and plug them into the lower graphics card, cable tying up the excess slack into a neat bundle, lying this on top of the cards. With all our data cables and some power cables already laid out, it's time to get the PSU – and start swearing.

Now keep in mind this isn't the PSU that Silver-Stone recommend for this case (rather they suggest the ST1200 PSU with shorter PP05 cables), but it's definitely a great choice for the tech we're running. Rest it on top of the case, and plug in the 8-pin CPU power connector, then gently lower the PSU into place. Plug in the 24-pin power connector, and bunch up the slack to get it out of the way, while threading the 8-pin power cable alongside the DVD drive. Plug in the two hardwired PCIe power connectors to the remaining graphics card, and plug all modular cables in while making sure they're clear of the fan frame below.

A very tricky part is next; hold all the cables in place as you lift up the fan bracket and reinstall it via the plastic clips. This is hard because the





cables place enough pressure on the bracket that unless completely secured it will simply pop out again, and your cables are already precariously placed – don't pull too hard on them or you'll have to redo them. I found that turning the case vertically helped a little, but either way you should have a neatly cabled final result that has everything connected bar the SSD.

Carefully wiggle the side bracket holding the SSD back into the case, using your five hands and sixty-three fingers to hold back all the cabling/tech, and secure it with screws. Fit your fingers through the small space and plug in the SATA data and power cables, throw the sidepanel back on and press the power button – and cross your fingers that nothing went wrong. Nothing did with

ours, and it booted up correctly the very first time. Avoiding any hiccups is definitely recommended, so take your time and you should be okay.

## The thin red line

The whole point of this incredibly complex endeavour was to get performance that is incredibly easy to pick up and go to your mate's place. Well, we have met those goals – and even exceeded our own expectations!

Tipping the scales at a total combined weight (case only) of 14.4KG, the handle on the top of the case is more than sturdy enough to take the load. The LCD screen we modded into the top of the case displays temp info for the CPU, mobo and a lot more, which is really handy for monitoring (as well as showing off). It's a tiny case too – imagine rocking up to a LAN with it and out-performing every single person there with your beast. We're serious about performance too: the rig tipped our benchmarks at 22,470 in 3DMark06, P18,770 in Vantage and an average fps of 75 in Crysis. Not only that, but running 3DMark06 on our 30" LCD at 2560 x 1600 res @ 8xAA we still got a score of 15,224, an amazing result for such a teensy-tiny build!

In terms of noise it isn't bad either, inoffensively whirring away as it pumps out more frames than any other computer that size. If you asked us now, after all the effort and hours put into this build if the final result was worth it, what would our answer be?

We'd give a one-hundred percent Atomic yes, every single time.  JR





TIME TO  
COMPLETION  
30 MINS



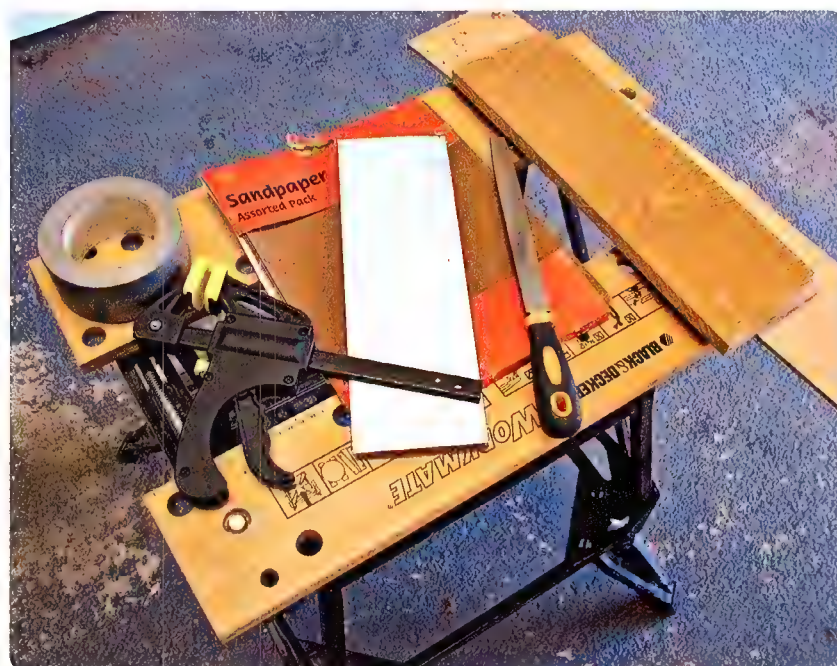
# How to brush aluminium

Give your aluminium case a luxury finish by following Josh Blodwell's brushing guide.

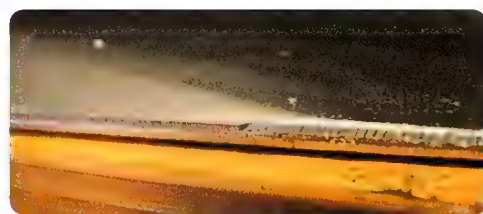
**H**igh-quality aluminium cases, as well as various gadgets, often have a brushed exterior. Brushed aluminium looks great, feels velvety to the touch, and is also very good at hiding small scratches and scuffs. If you're mak-

ing your own case, or want to add a luxury-style finish to your existing aluminium case, we'll take you through the principles of creating a great brushed finish that will make your case look as though it has been professionally touched up.

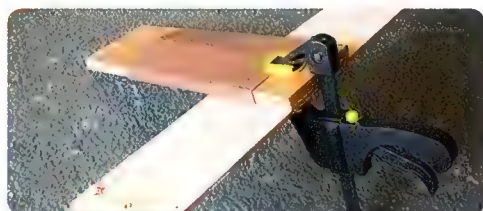
In our example, we show you how to brush a small strip of aluminium, which shouldn't take you more than half-an-hour to brush. You probably already have most of the tools, and even if you don't, they can all be picked up cheaply.



For this guide, you'll need two strips of wood and a clamp to hold them together. You'll also need duct tape, sandpaper, a file and a workbench or table with at least one straight side. A paintbrush or dustpan brush will also be handy for removing aluminium dust.

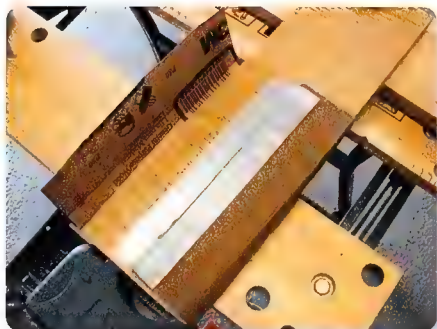


Take your aluminium plate and, if it's a new piece, remove its protective plastic. After that, place it on your workbench and use a flat file to grind away the sharp edges. File with light pressure at a 45-degree angle until there are no razor sharp edges that may cut your sandpaper.



You can now make a sanding jig by wrapping a sheet of sandpaper around one of your pieces of wood, and then placing the other piece of wood underneath so that it traps about 10mm of the sandpaper. After that, clamp the two pieces together as shown. We used a harsh grade of sandpaper to achieve a more noticeable effect, but you could use a finer grade for a smoother finish.





If you're brushing a larger sheet of aluminium, you may have to attach the sandpaper lengthways along the jig, so you won't be able to clamp the paper into the jig. Instead, you can use duct tape to hold down one edge of the sandpaper, and then wrap the sandpaper around the jig and tape down the other end.



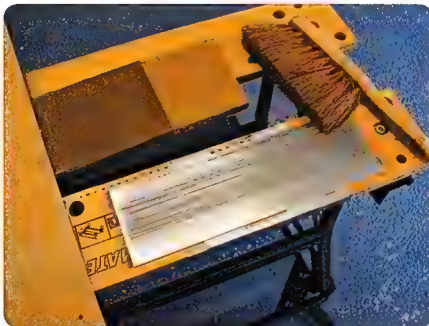
Place a couple of strips of tape across your workbench, so that the sticky side faces up, and hold them in place with a couple of strips of tape along the edges, sticky side down. Now place the metal sheet on top of the tape. If you don't have an adjustable workbench such as the one shown, you could use double-sided tape, or even a few beads of hot glue, to hold your metal to the bench.



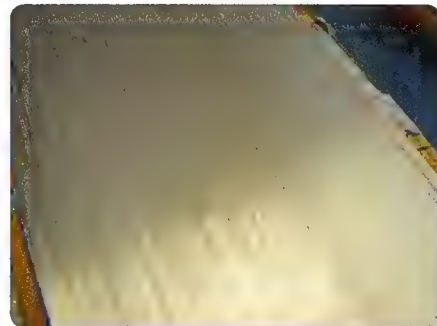
Lay your sanding jig on top of the aluminium, with the bottom piece of wood flush against the side of the workbench. The lower piece acts as a runner, which keeps the sandpaper moving over the metal in straight lines. This is the key to achieving a professional brushed finish.



Starting at one end of the aluminium plate, push the jig firmly and carefully over the full length of the piece. You'll see a few parallel scratches on the clean metal. It won't look very good yet, but this is perfectly normal. When you've completed one stroke, lift the jig, replace it at your start point and push it again. Pushing the jig in one direction lessens the chances of wobbly marks appearing, and helps to keep out metal dust.



After a while, the aluminium dust will start to build up. This won't cause you any problems if you're using harsh-grit sandpaper, but you'll want to clean this up if you're aiming for a fine finish. Periodically brush away the dust with a soft brush – an old paintbrush or dustpan brush will do the job.



Keep sliding the jig until the pattern of scratches becomes uniform. You'll see the pattern start to appear around the edges of the sheet early on in the process, but keep working at it until the entire panel looks the same. If there are areas that aren't as well brushed as others, replace the sandpaper, or remove the sandpaper from the jig and turn it around. Keep brushing until the finish is uniform.



When you've finished brushing your metal, be very careful not to put your fingers on the surface. The fine scratches trap dirt, and there's absolutely no way to remove the dirt without placing the metal back on the jig and sanding it out.



If you stuck your panel to the workbench with duct tape, don't try to rip it off, as you'll bend the panel. Instead, cut the tape with a sharp knife, lift the panel and peel the tape from the back of the metal. If you used hot glue to attach the panel to your work surface, warm the metal with a heat gun to melt the glue, lift the plate and then pull the glue off the plate after it hardens.

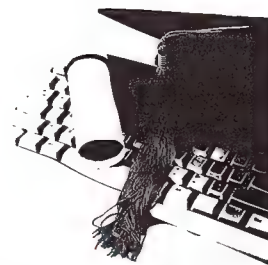


To finish your panel, you can cover it with a layer of automotive clear coat that's designed to be applied without an undercoat. We recommend using the lacquer used to coat alloy wheels for this, as it will provide a strong and clear finish. Other types of lacquer may dry with a slight yellow tint, which you don't really want. Alternatively, you could take your panels to a metal shop and have them anodised in a colour of your choice.



# Studying Overseas

Chris Taylor describes just what you need to give it your best when studying overseas.



**S**o many students come from abroad to study within our shores. This article is for those looking to head in the other direction – Australian citizens considering the option of studying abroad. Of course, it is somewhat deceptive to call it an 'option', as there are just so many paths that can lead you overseas. Some of our universities, for instance, have campuses in other countries. Monash University has campuses in Sarawak, Prato and Johannesburg. Curtin University of Technology has campuses in Sarawak and Singapore. Other universities have numerous 'partner' institutes located across the globe. And there are still other options.

## Enrolling locally, studying internationally

It is generally possible for you to spend, say, a semester at one of a local uni's OS campuses if you're an Australian student. When doing her Bachelor of Communication, for instance, a friend of mine elected to spend a semester at

Monash University's Johannesburg campus. In turn, some of her South African classmates came here the following year.

It's important to keep in mind that the overseas campuses of our universities aren't always as large as their local counterparts. Monash University's Johannesburg campus is pretty small, for instance. They don't offer the same variety of units or courses.

Australian universities with campuses abroad include the University of Newcastle (Singapore), the University of Wollongong (United Arab Emirates), Monash University (Malaysia, South Africa and Italy), RMIT University (Vietnam), Swinburne University (Malaysia), James Cook University (Singapore), Curtin University of Technology (Malaysia and Singapore) and the University of Adelaide (Singapore).

In addition to the rather small number of universities that have campuses abroad, most universities have partnerships with overseas institutes. You're overseas, but you're not enrolled in an overseas institute as such. The overseas

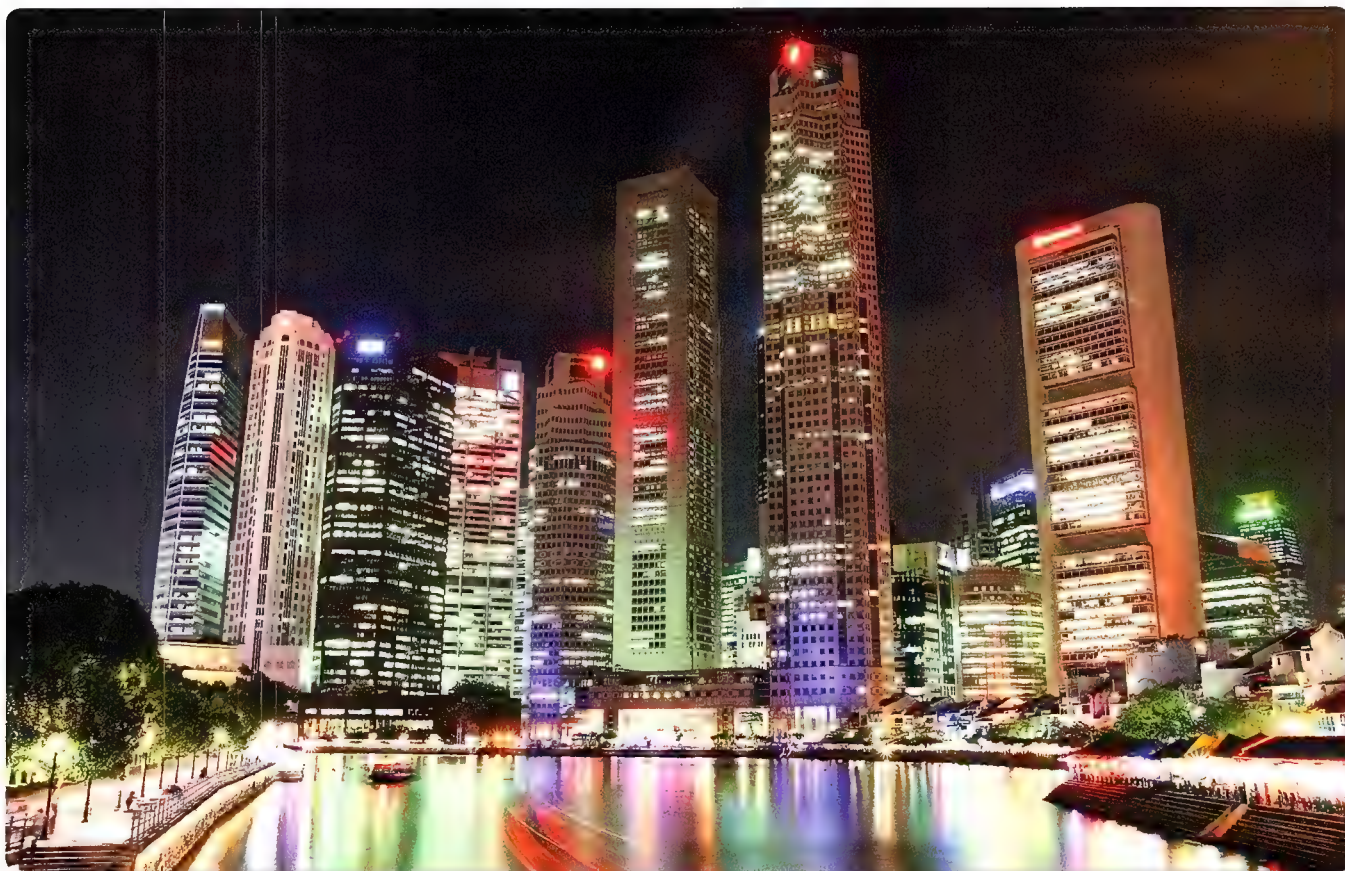
institute has little to do with you; you still deal with whatever university you're enrolled in back in Australia. Essentially, you're just swapping the facilities of an Australian university for the facilities of one of their international partners and undertaking overseas units that are the equivalents of something offered locally. In some instances, Australian universities actually offer their own units through their international partners.

Students considering this option will be pleased to hear that, as a general rule, the HECS-HELP scheme will cover your studies abroad. You're still an Australian student, after all. If you're considering this option, it would certainly be worthwhile checking whether this is true of your course and institute.

Keep in mind that you'll probably need to get some sort of student visa, however.

## Enrolling internationally

Enrolling at an overseas institute and completing the entirety of your studies there is yet another option. The exact requirements vary from insti-



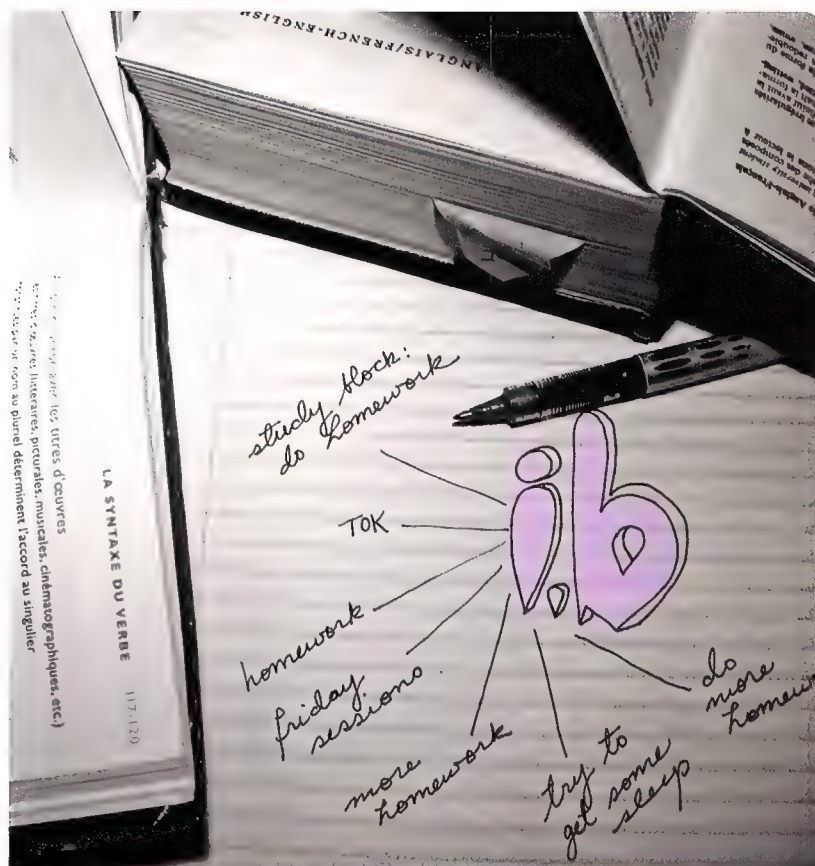


tute to institute, country to country. You'll need to apply for some sort of student visa, which will probably involve a lot of arduous paperwork. To get into the United States as a student, for instance, you'll fill out a number of forms that are available through the embassy. Once you've applied for an actual course at a US institute and been accepted, someone at that institute will send out yet another form, known as an I-20, which you'll have to hang on to all the time when you're in the US, as it will provide a record of all your immigration information, including your authorisation to work.

More information on specific countries can be found online through sites like Study Overseas ([www.studyoverseas.com](http://www.studyoverseas.com)), but use such sites as a general guide only. You're supposed to be intelligent and resourceful, right? Contact the relevant embassies and Google the relevant immigration departments. Visa requirements can change and non-official websites can take a while to reflect these changes.

Entry requirements, beyond visas and official forms like the I-20, vary from institute to institute and country to country. If you're heading somewhere where English isn't the language of instruction, you might have to sit a language test or enrol in some sort of language course. Of course, the visa requirements of some English speaking countries might require you to sit one of these tests even if you're a fluent English speaker.

Academically, you're obviously going to need your academic transcripts from secondary school and/or any undergraduate courses you've completed. There is the International Baccalaureate ([www.ibo.org](http://www.ibo.org)), a two-year program that universities around the world recognise.



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Keep in mind that the two-year diploma, which is the highest level of International Baccalaureate – the equivalent, we suppose, of HSC – is aimed at 16 to 19 year olds. If you've already left school and are past that age, you can forget about it. Local universities also recognise the International Baccalaureate, so if you've still got some time left before Year 11 and 12 you might consider undertaking the International Baccalaureate at one of the many schools located across the country. Some universities, particularly in Canada and the US, provide special scholarships for high-achieving International Baccalaureate students.

## Money

Speaking of scholarships, depending on where you want to go, a good many are available. The Australian government is running a programme entitled the Prime Minister's Australian-Asia Endeavour Awards, which are available to both local and Asian students at both undergraduate and postgraduate levels ([www.endeavour.deewr.gov.au](http://www.endeavour.deewr.gov.au)). You have to study in Asia, of course. That's the whole point. Furthermore, 40 awards are offered to Australians annually – 20 at an undergraduate level and 20 at a postgraduate level. Competition is fierce.

The afore-mentioned Study Overseas website is a good starting point for finding out about

scholarships specific to certain regions, countries or institutes. Keep in mind that very few scholarships are going to cover everything. Most will cover a part of your fees and possibly only for a short time (a year, for instance). Furthermore, with scholarships comes added pressure to perform academically. On-going scholarships will typically require you to perform at a certain level if you're to continue receiving support.

Researching the various scholarships that are out there is a worthwhile exercise. Studying overseas is expensive. The fees you'll pay

play money, but that's about it. You'll need some other stream of income – a very good scholarship or very generous parents, say – to cover the fees and everything else. Depending on where you're going and the type of student visa you apply for (the US, for instance, offers a number of different ones), you may have to provide evidence of suitable financial support or resources.

We hate to labour a point, but seriously, don't relax when it comes to the financial side of studying abroad. Though governments do everything they can to ensure incoming

## ...to make matters worse, your visa will probably place severe restrictions on the amount of work you can do.

will probably be significantly higher than what the locals pay. Subsidies and loans available to local students probably won't be available to you. And to make matters worse, your visa will probably place severe restrictions on the amount of work you can do. In the United Kingdom, for instance, you won't be able to – legally, that is – do enough work to pay for your tuition. Their restrictions on work mean you'll have a bit of

students have financial support, the responsibility ultimately rests with you. Your parents might offer to support you, but a sudden change in their financial situation could leave you in hot water. Consider taking a break of a year or two after school to work and save some cash. Of course, if you've already been in the workforce for a number of years, you're in a much better position. If you're still in school or an undergraduate course, bust your arse getting good marks and research the various scholarships that you might be eligible for. The careers advisor at school might have some valuable information. Similarly, if you're still completing an undergraduate course, ask the university about partnerships they have with international universities. You might find that there's some arrangement that could make your financial situation easier or your acceptance into an international institute more likely.

Finally, consider yourself. Even if you get a scholarship or have adequate financial support, you may not be a suitable candidate for studying overseas. Some students who come here just can't cope when the excitement wears off and they realise they're a long way from home and don't know anyone beyond the confines of the campus. Language and cultural barriers contribute to this significantly. My friend who went to South Africa, for instance, had only ever known a culture where it was completely normal to walk to the pub after dark. That's not the done thing in Johannesburg, unless you're looking to be relieved of your wallet and possibly be gifted with a Soweto smile. This was her first time overseas and she spent almost all of her time, even during weekends, on campus for a fear that, while somewhat founded, was made worse than it probably would've otherwise been because she didn't do a great deal of research on the city before applying to study there and adequately prepare herself. Make sure you do your research. If you're uncomfortable with the sound of a place in terms of culture or security, either don't go there or do your best to visit as a tourist before applying to study there.





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# Bad science, no biscuit



Even teddy bears lie about statistics, but Facebook won't give you cancer.

**E**ver had the feeling that spun sheep's fleece is being gradually lowered over your ocular faculties? Take, for example, the following statement, which may or may not actually be about teddybears.

"Researchers estimated that about one in eight teddy bears drink tea. However, they estimated a similar number of rag dolls also drink tea. In general, both teddy bears and rag dolls drank tea at picnics. In only 27 per cent of cases were teddy bears the only ones drinking tea at picnics, while for 24 per cent of cases, rag dolls were the only ones drinking at picnics. The rate of rag

also do some debunking, related to psychology and evolution, respectively.

It takes a bit of practice to do your own debunking, but it's eminently worthwhile, especially once you start to catch the bad science reporting in eminent newspapers, politician's statements, and the like.

A good starting point is to get a classy book explaining how people lie with statistics, such as 'The Tiger that Isn't' and 'How to Lie with Statistics' that will help you remember to check your stats (just like your parents always told you to do, in case you got in an accident).

The doctor in question said using Facebook could increase levels of isolation – loneliness and isolation is associated with higher levels of cancer, strokes, heart disease and dementia. It's a pretty long bow to draw, and it looks even sillier when you discover that the majority of studies on loneliness and the internet show that the internet helps relieve loneliness (confirmed by a quick search on Google Scholar for loneliness-internet) rather than cause it.

Okay, so Facebook probably won't cause cancer, but what about the rest?

Admittedly, there haven't been enough studies to say whether Facebook is good for you or bad for you, overall, but I suspect the truth won't be newsworthy. As a scientist, therefore, I'm going to go out on a limb and say that if you're prone to procrastination, and find that it hampers your productivity, Social Networking might not be the best thing to indulge in for hours on end, so use it in moderation, okay? Oh, and don't post naked pictures of yourself where your boss (current or future) might find them.

Can I get my headline on CNN now? (P)

Zara Baxter has a degree in microbiology and genetics, and thus tells lies that are only viewable under a microscope and can be passed on to successive generations  
[zbaxter@pcauthority.com.au](mailto:zbaxter@pcauthority.com.au)

## Facebook apparently also causes cancer, rots children's brains and makes you a bad mother.

dolls drinking tea at picnics was 4.6 per cent. 47 per cent of teddy bears who drank tea did so at every picnic. 53 per cent of ragdolls who drank tea did so at every picnic."

Notice that what was done there was to selectively present only a portion of the statistics. We never find out what the rate of teddy bears drinking at picnics actually is.

Without the additional pieces of information, we can't judge who really drinks more tea at picnics. But the initial sentences make it sound as though there are pretty equal numbers of tea-drinking bears and dolls, so you might assume that about 4.6 per cent of teddy bears drink tea at picnics.

Thanks to Google Scholar, I did my research and discovered that about 60 per cent of teddy bears drink tea at picnics, on average. This changes how you look at the data entirely. The statistical sleight of hand in this case is a relatively obvious example, but there's plenty more bad science to play with. One of my favourite haunts on the internet for watching real live bad science debunking by professionals is Ben Goldacre's blog, Bad Science, at [www.badscience.net](http://www.badscience.net). I've seen our own Dan Rutter hanging around on Bad Science, where this stuff gets picked apart like a zebra carcass by a pack of hyenas.

Mindhacks ([www.mindhacks.com](http://www.mindhacks.com)) and Pharyngula ([scienceblogs.com/pharyngula](http://scienceblogs.com/pharyngula))

A recent example that's been reported poorly in a number of places is the moral panic over Facebook and Twitter. Researchers at Ohio State University found that college students who use Facebook have a lower grade-point average than those who don't.

Now, as most bad-science-debunkers know, correlation doesn't equal causation – we don't know, from the study, whether or not using Facebook causes a lower GPA. For starters, we don't know what GPA the students had before they started using Facebook to see whether using Facebook actually reduced it, and we don't know whether their grade would pick up if they stopped; you'd need both pieces of information to say for sure that Facebook is bad for you. The researcher, Aryn Karpinski, points out that the study doesn't suggest that Facebook causes lower grades. Time quoted Karpinski as saying "Maybe [Facebook users] are just prone to distraction. Maybe they are just procrastinators," but that didn't stop headlines from saying that Facebook is bad for you. According to headlines, Facebook apparently also causes cancer, rots children's brains and makes you a bad mother.

The UK's Daily Mail, in outlining the cancer risk of Facebook, said "Social networking sites such as Facebook could raise your risk of serious health problems by reducing levels of face-to-face contact, a doctor claims."







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# GAMEPLAY

GAMES, GAMING AND FILM COVERED... ATOMIC-STYLE

Issue 100 was a bit light-on last month, so we've redoubled our efforts to really pack in lots of stuff; from Seamus Byrne's indepth look at Blood Bowl all the way to full reviews including a Call of Juarez preview, Wheelman, Stormrise, Resistance: Retribution and the new Star Trek movie.

We've also included lots of pics from our 100th Issue birthday party, where beer and pizza were devoured in copious amounts to great delight – and our cake definitely wasn't a lie! Part one of a new story arc for Fallout has also begun, so tune in and enjoy!

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# Blood Bowl

Seamus Byrne speaks with Cyanide's Antoine Villepreux about lifting a faithfully bloody version of Blood Bowl off the table top and onto your PC.

**Y**ou might never have played the game, but any geek worth their salt has at least heard of Blood Bowl. It's been almost 22 years since this now classic miniatures boardgame first joined the Games Workshop oeuvre, bringing a twisted, deadly version of American football to a fantasy realm. The game itself has evolved dramatically through four boxed releases and five further rules updates, and loyal fans have devised their own unofficial ways to play online.

It's also been 14 years since the last attempt to bring the game to life as a videogame, with fans in recent years devising their own methods for bringing the game to digital life. But now Cyanide Studio is adding the spit and polish to its new, richly detailed version for PC and consoles. And if what we're hearing is correct, fans are on notice — they're very serious about making it as true to the board as possible.

"Our primary goal was to make a faithful adaptation," says Antoine Villepreux, Cyanide's Production Director and Blood Bowl Project Manager. "Simply because the tabletop game







deserves it: it's a very rich and fun game that needed a better adaptation than the now very old one."

To that end, the videogame is focused on a turn-based mode that aims to carefully transcribe the Living Rulebook 5.0 and the overall spirit of the game.

While delivering a version of play ideal for league and tournament play for the current fan base, Cyanide is also delivering a 'Real Time' mode for those looking for something with a different flavour.

"We tried many gameplay styles for the Real Time. We even tried a very arcade one, but rapidly came back into what makes Blood Bowl unique — the strategy behind the sport aspect. So the Real Time mode looks more like a traditional RTS than a sport game."

Cyanide Studio isn't a complete stranger to the idea of violent fantasy football, having released their own game, Chaos League, in



**...even with the latest rules now stable for almost three years, arguments still arise.**

2004. There were some tensions with Games Workshop at the time due to Blood Bowl similarities, but on the announcement that Cyanide was awarded the Blood Bowl license in 2006 all differences were settled and the Chaos League title was even assigned to Games Workshop as part of the deal.

That said, Villepreux was very clear that Blood Bowl was very much a 'back to square

one' production. "We started everything from scratch again. Zero line of code or data was reused. In fact if you look at both games, you rapidly see they are really different games."

The team working on the game features a mix of interest levels in the source material. Some hadn't heard of the game before starting on the project, while others were deep enough into the scene they'd painted up their own teams. But Villepreux suggests more than a few have since gotten into it and now play on a regular basis.

With such a serious scene attached to the pre-existing game, getting the rules just right is clearly a top priority. Yet with many rules versions across the history of the game, finding a canonical interpretation is no simple task. One part of Cyanide's effort to be as faithful as possible in their adaptation was recruiting confirmed Blood Bowl board game players to early beta testing to get their insights into refining the product. But even with the latest rules now stable for almost three years, arguments still arise.

"Blood Bowl has very complicated rules that have often changed in the past, and we discovered that only a few people knew them perfectly," says Villepreux. "We had some interesting debates between players, and sometimes with Games Workshop's guys, having diverging point of views on particular aspects of the rulebook. I will not promise that nothing has been left out, but I'll ensure we did our best and put a lot of effort into it."





## Blood Bowl's Next Top Models

When we're talking Blood Bowl, we're talking the same rabid dedication to miniatures you'll find in any Games Workshop universe. So just like the rules, Cyanide knew they had to pay close attention to how they executed on the player models in game. At launch the game will feature Humans, Dwarfs, Orcs, Wood Elves, Goblins, Lizardmen, Skaven, and Chaos races. Each with loyal fans expecting their race of choice to look just so. The big question for Cyanide was whether to target faithful interpretations of known game miniatures, or to add some of their own flair to the graphic designs for the game.

"Our first approach was indeed to take the miniatures and simply try to reproduce them," says Villepreux. "But it soon became clear, for us and Games Workshop,



that it was not the way to go, and that with new support for Blood Bowl should come a new vision of the universe. So we worked a lot with Games Workshop to give this 'new look' to the characters, but keep the spirit intact. We had to find a good compromise between the old miniatures style and the more recent Warhammer miniatures style."

For those eager to customise their own teams, Blood Bowl doesn't have a team painting tool along the lines of what you can find in Dawn of War. But there are points of customisation included in the game covering colours, logos, equipment, and even skin and body variants to work with. Villepreux suggests that while they wouldn't consider what is available a 'tool', there is enough on offer that beta testers were modding characters and realising some great modified teams.

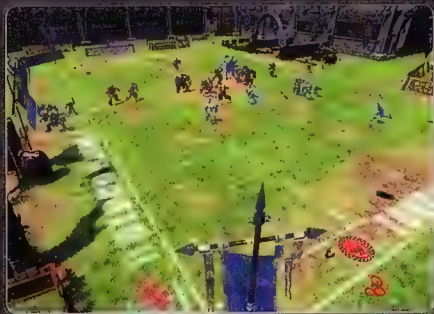
## Blood Bowl as management sim?

Serious fans aren't going to be into this title for a quick match here and there, and to that end Cyanide offers an interesting, tangential pedigree that suits dynastic league and tournament modes where perfect coaching can be just as important as perfect play. While Chaos League showed its interest in the genre, the studio spends most of its time on niche sports management titles, including Pro Cycling Manager, Horse Racing Manager, and Pro Rugby Manager.

"We have a long tradition of management game making at Cyanide," says Villepreux. "And Blood Bowl did not avoid that treatment. You can build your own roster in several game modes."

When you start playing you can build a team from scratch, starting with a bunch of rookies who level up across matches and tournaments, gaining experience and skills as they become veteran and potentially even star players. But this is Blood Bowl, so managing your roster to ensure you always have new stars on the rise is important — your best player could be targeted and killed at





any time, and dead is dead in this game.

In Competition mode you have championship and cup modes that run across multiple seasons, where you can also create your own custom competitions. Campaign mode offers different tournaments in a professional circuit, starting from small tournaments and then leading up to the greatest tournament of all, Blood Bowl, as you take your own team onto the field against the game's most famous teams, such as the Reikland Reavers.

Online leagues can be played as private leagues played amongst friends, or you can join the public leagues where you compete for standing on a world rankings table. Plus there are LAN and hot-seat modes so you can run entire leagues with a single game and a bunch of friends gathering at the one machine.

Along with the adherence to Living Rulebook rules, any game, campaign or league can be run with extensions including player contracts, purchasable equipment, team sponsors, and other inducements that add a great deal of importance to the off-field game.

In a game with as broad a base as Blood Bowl, not everything can make the cut. But while a lot of rules and, in particular, some well loved races are missing from the game launch, Villepreux hopes the reception for the game will be strong enough to give them a market for adding even more extensions to the setting.

"Of course new races would come first, and we

## Blood Bowl: a primer

Also known as "Insights into why a bunch of grown men giggle like schoolgirls about the arrival of a fantasy gridiron rip-off as an up to date computer game."



For the newbies, Blood Bowl is a table-top miniatures based board game from Games Workshop, basing teams around Warhammer Fantasy races.

In the computer game the races at launch will be Humans, Orcs, Dwarfs, Skaven, Lizardmen, Goblins, Wood Elves and Chaos. The board game features many more races, such as more Elves, Dwarfs, Halfings, Ogres, and a wealth of Undead.

While the game is at its core about scoring touchdowns, the game's fun is in doing your utmost to hurt the opposition in violent, and amusing, ways. A team is much more than its on-field players, with fans, cheerleaders, apothecaries, spells, and dirty tricks all playing a role in shifting the balance of power in a match.

And just as any Warhammer fan loves to build their army, Blood Bowl brought the fast-paced feel of a sports game together with every miniatures fan's love of building the best possible team they can make based around races that suited their personal preference. In a sense, there is

also a roleplaying aspect to Blood Bowl as players gain experience and develop skills over the entire course of seasons and tournaments.

Compared with playing Warhammer, Blood Bowl offers a broader set of hooks for different kinds of players. Miniatures fiends can dive into painting up teams just like they can their armies, stat lovers can tweak and refine their team skill set to create the perfect Elven passing team or a Dwarfish brick wall defensive unit, and more casual players can just have a team that hits the field for an hour, causes some mayhem, scores some TDs, and heads on their merry way.


With player customisation options, deep team management, and easy play on offer within this new game, there is potential to still deliver all the most loved features in videogame form, while letting us play online far more regularly than we could ever get together with other Blood Bowl lovers to play the table-top version. And THAT is what we're so damn excited about.



already know which ones," he says. "But we can also imagine adding more stadiums, or adding existing board game extensions, like cards."

Blood Bowl is something of a genre buster. Sport management sim meets turn-based strategy by way of fantasy warfare plus a healthy dash of humour. Some might even say it could be the ultimate blend of sport and fantasy gaming.

"Well I don't see many strategy/fantasy/sport crossovers out there anyway," says Villepreux. "That mix is fun! We do think any player interested by strategy should be interested in Blood Bowl. And that strategic aspect being combined with violence and lot of fun brings some fresh air to videogames."

Let's hope we get the game we've been waiting for, and the world falls in love, so we can get our hands on some extensions and additional races. Undead FTW! 





# Call of Juarez: Brothers in Blood

Strap on your shootin' irons and mount up!  
It's western FPS time!

[PREVIEW]



The original Call of Juarez was, if not a hit, at least warmly received, like a hot wind blowing in off the rolling prairies of the great American West. It had some interesting gameplay mechanics, all in effort to wrangle the FPS into a cowboy frame of mind. The sequel, due out some time in the middle of this year, is a flashback to the early days of the McCall brothers, as they desert from the Confederate army in the dying stages of the American Civil War and take to a life of crime in order to rebuild their shattered family home.

The opening levels are the classic tutorial walk-throughs you might expect from an older game, but here it's actually quite useful. Brother in Blood has some unique gameplay elements that

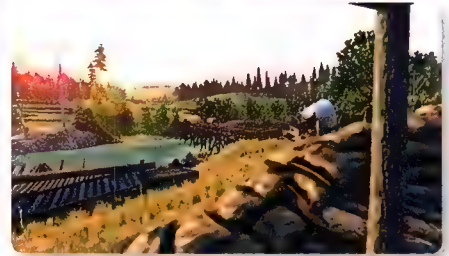
it doesn't hurt to become familiar with while the challenges are reasonably light.

For one thing, you can choose to play as either brother, and they both have unique skills that will affect the way a given level unfolds. Similarly, when the two brothers come together, there are

numerous tricks they can perform to operate in tandem, and then there's neat tricks like using lassoes to latch onto objects, kicking down doors or the game's unique quick draw showdown system. There's a lot of neat ideas galloping around the game, but, sadly, it doesn't really gel







together all that well just yet.

The choose-your-bro mechanic seems neat at first, but really the choice comes down to what mini-game you prefer (kicking in doors for the tough one, lassoing and knife-throwing for the agile one), and which character's voice irritates you the least – there's a lot of voice-work in

Brothers, and it ranges from vaguely authentic nasal drawls where you can practically hear the chewin' tobacco in their mouths to merely annoying and highly repetitive.

Also, at an effort to make the six-shooter and rifle gameplay a little more... period, the accuracy of many of the weapons seems to be set at

'non-existent'. Sure, the game features different grades of weapon quality, and claiming bounties on baddies gets you cash for upgrades, but it's still leads to many frustrating levels early on when you can only afford a rusty classic pistol. At least the weaponry is satisfyingly visceral in its design and looks, and using a chopped down scattergun to clear away enemies is a special, if bloody, treat. The more enemies you kill, the quicker you can unlock special moves, which are essentially bullet time combined with more accurate gunfire. This does offset the otherwise poor accuracy, but also breaks the flow of the game more than we'd like.

As we said, there's a lot to like about Brothers in Blood on paper, but it's not quite perfect yet. Whether or not the issues we experiences are set to be ironed out before release will be the clincher – the voice work is likely final, but the ballistics could well see some serious tweaking between now and when the game comes out. If you're a dyed in the wool fan of the sparsely populated genre of western shooters, though, there's just not enough games for you to picky, though. It's hard to be excited with what we've seen – but we'd sure like to be proven wrong, pardner. **DH**

PC, Xbox 360 and PS3

Developer Techland  
Publisher Ubisoft  
Website <http://www.callofjuarezgame.com/>



Atmospheric game engine; interesting mix of mechanics; long coats.



Annoying voice acting; totally inaccurate representation of Civil War era armaments.

Anticipation rating

Could be a good game with a bit of work. Wait and see...



**74%**







# Wheelman

Vin Diesel logs time behind the wheel of this... interesting take on the open world racer

**W**e like Vin Diesel quite a lot. After all, the man is mother-fracking Riddick! And he's pretty good in other films, like Saving Private Ryan, and for some reason a whole mess of people really like him in the ludicrous Too Fast film franchise (It's Fast and the Furious!! -Tech Writer). On top of that, he's a dedicated gamer on and off the computer.

But that doesn't mean he occasionally doesn't get behind a stinker, either on the silver screen, or like Wheelman is, on your computer screen.

Actually, calling Wheelman a stinker is a bit harsh. It's actually pretty good fun at times. The

more the game tries to copy its bigger, better cousin, the more it fails.

The mission structure lets you either wander around finding missions yourself, or you can simply port straight to them if you don't care about ripping apart any sense of immersion the game might be able to promote. And by straight to them, we mean you can be standing on the street (never a good idea, anyway, given the God-awful foot controls) take a Taxi mission, and then find yourself in the driver's seat hauling around your passenger. Magic!

Because of the light (read: non-existent) approach to storytelling, we never really felt too



super-slick, stupidly impossible moves to run poor innocent cops off the road.

Which is ironic, really, when you consider the amount of dead and mutilated police you're leaving in your wake; and you're meant to be the good guy.

If every other aspect of the game were as much fun, this really would be a thrilling alternative to GTA, a worthy entry in the open world racing genre. As it is it's something else again – fun enough assuming you don't have to pay for it, but never a game that you're going to actually invest in.

Poor Vin. **DH**

## What drove us on, though, was the chance to truly mess up any car that gets in your way.

game places you in Vin's Wheelman shoes, as some undercover character hoping to foil some sort of plot in Barcelona by hooking up with and working for various underworld criminal enterprises. To be honest, there's not much more to the story than that.

Driving around Barcelona certainly sounds appealing, but the attempts at turning it into an open world city reminiscent of Liberty City never quite works – there's nothing to make the city seem real, or make you a living part of it. That's as close to a mortal sin you can get when you're making a game which is so obviously trying to emulate GTA. The streets and parts of the city are all rather samey, there's no real economy to speak of, and the idle conversations and such that you hear as you move about the world are empty at best. There's a handful of radio-stations, some of which are actually not too bad, but the

compelled to seek out missions. What drove us on, though, was the chance to truly mess up any car that gets in your way, thanks to the one fun innovation that Wheelman does well – vehicle melee.

It may sound stupid – it did to us – but when you're driving you can control violent swerves or accelerations to shunt aside opposing vehicles. It's a great way of freeing up some driving space, and if you do it enough you'll be treated with slow motion rendition of your poor enemy's fiery demise. You can also drop into slow-mo bullet time, effectively, and even 'airjack' cars – a special attack that literally propels you through the air from one car to the next.

It sound a little outlandish, but the end effect is pretty cool. Wheelman, at its best, feels like the ultimate Hollywood car-chase game, with burning wrecks, racing gunfights and some

360, PS3, PC (reviewed on PC)

Developer: Midway Studios  
Publisher: Ubisoft  
Website: [www.wheelmangame.com](http://www.wheelmangame.com)

**Graphics**  
Solid, but for the love of God give AA options.

**Gameplay**  
A real mixed bag of innovation and bad decisions.

**Sound**  
Gritty and detailed. Great driving sounds.

79

63

89

**Overall**  
Wheelman spins and blows a tire. Sad.

**68%**







## Windows is installing your updates...

**B**y now, we wanted to have a really good idea of what Stormrise is like, but... Games for Windows LIVE.

Those who know the pain that those four words usually engender will be wincing in empathy. I'm certainly wincing, as LIVE update after LIVE update trundles drunkenly down the information mega goat track to our test-bench gaming PC. Truly, is there anything a gamer dreads more than these words?

"There is an update available for Games for Windows LIVE. Cancelling this update will log you out of Games for Windows LIVE."

As a game distribution service GFWL is a raging mediocrity. As an online gaming metahub it's annoying at best, and at worst is likely the number one contributing factor to the rising number of gamers going postal and killing their nearest and dearest.

It's also impossible to play a GFWL game without being signed in to bloody GFWL!

This may seem a 'crazy' and 'seditionist' attitude, but when I buy a game, I want to get it home, rip open the packaging, roll around in the new-game-smelling cellophane for a bit, and

then – call me a dreamer – play the damn game! Zero day patches are bad enough, but when you combine it with this kind of skulduggery, well... I just want to kill my nearest and dearest. Anyway, rage aside, I'm going to go check on the update.

... Please kill me. There's a second bloody one. And, hey, look, a third! I mean... gah, I just don't have any words. Maybe this time...

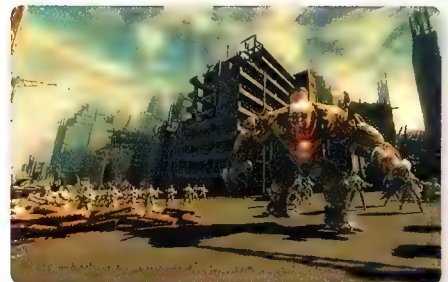
... You have got to be kidding. At the risk of sounding like old school tennis player, John McEnroe, what is *happening* with LIVE! After the updates run, it now tells me the LIVE log on servers must be down.

This is why evil dictators rise up and enslave millions. Idi Amin must have been a beta tester for LIVE.

It would be laughable but the for the fact that this entire process has literally stopped this review in its tracks. I want to tell you my opinions of the game – would love to, 'cause I rather like my job – but I can't. To be honest, I could probably find another game to review; but in many ways this is my honest report of the process of trying to play Stormrise. It's just a shame that all I can actually tell you is this...

Stormrise features a moody startup screen, which players are treated to after a stirring sequence of hardware vendors and publisher's logos. As you stare across a ruined cityscape, the camera gently sways from side to side. The music is a mournful wail in the background, as the Log In to LIVE option flashes tauntingly in the foreground.

As start up screens go, it's pretty damn good.



Maybe when Microsoft sorts out LIVE, and I can tell you a little bit more about the actual game. **PDH**

(Although, with a Metacritic score of 40 on PC, perhaps LIVE is doing me a favour...)



PC, PS3, 360 (reviewed – ha! – on PC)

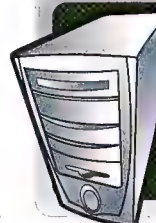
Developer Creative Assembly  
Publisher Sega  
Website [www.stormrisegame.com](http://www.stormrisegame.com)

**Graphics**  
Best loading screen evah

**Gameplay**  
Watching a progress bar has never been so much fun.

**Sound**  
Oh God I can't keep this up!

NA  
NA  
NA



**Overall**  
Please, Sega, everyone... stop making GFWL feel welcome!

**NA%**





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# Resistance: Retribution

Sony's shooter of choice on the run.

**R**esistance: Retribution (RR) is a game based around the same universe as the original Resistance: Fall of Man, but they're not on the same platform – RR is solely the domain of the PSP. We've had a few problems with first person shooters on this console before, but can this game finally cure our woes?

The original game was based in Britain during 1951, as you played as Sergeant Nathan Hale against an invading force called the Chimera, which rocked into the country and began infecting people, turning them into Chimerans then adding them to their pool of soldiers. Essentially they're similar to Doctor Who's Cybermen, and throughout the first game you eradicate them completely from the country; winning yourself some nice medals in the process.

Continuing this story in RR is another soldier, a Lieutenant by the name of James Grayson. The game begins with him in prison, which is explained as his mental breakdown due to having to kill his infected brother, and running away from the fighting. Unfortunately this is really the only part of the story that is explained, leaving every other part of who the enemy actually are and why you're fighting completely ignored. If you've not played the original game be prepared to simply wait for emotional cutscenes to finish – you really won't understand them otherwise.

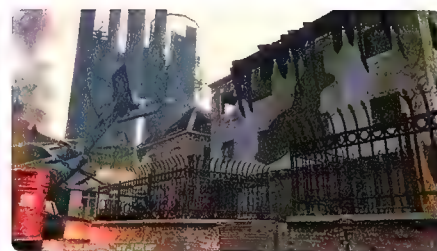
After Britain is freed, Grayson is contacted by a member of the Maquis – the French Resistance. It seems that the cheese-eating surrender monkeys were too busy wining and dining to bother fortifying their country, and need his help. So off you go, taken inside a plane and flown to France to help them fight the enemy, and treated to a ten-minute long cutscene. This isn't actually a bad thing, as each cutscene

is lavishly animated and drawn, with excellent voice acting (apart from one French woman who only sounds French when she has to say very specific and stereotypical keywords).

The game kicks off with the standard tutorial-style interactive level, holding your hand through all the controls as you get used to aiming with the somewhat awkward PSP. The analogue stick spins you around on a pivot, while the direction buttons control forwards/back/strafe. Weapon and interaction buttons are on the triangle, square, and X button, while circle controls the auto lock-on, which is essential – you're nowhere near accurate or fast enough with the analogue stick.

Shooting is quite easy with the right shoulder button, and the secondary fire or zoom activated with the left button, but the limited selection of weapons can make it feel almost pointless to bother changing. Special functions that weapons have can also seem useless – one lets you charge up your remaining ammo clip and fire a blade of energy, but this is as effective as slapping them with a slightly soggy piece of tuna and ultimately a waste. One particularly pleasurable weapon to use is the sniper rifle, and once you get over the awkward zooming system it's incredibly fun to pop off headshots in the game's surprisingly detailed world.

Enemies present themselves in small groups, usually five or so at a time that seem to be simply waiting around for someone to come in and kill them. You need to take cover when fighting, achieved by simply walking into low-lying cover, but even if you don't always feel the need you've a pretty good chance against most baddies you'll fight. We played on the medium setting, and health packs were so common that you can simply run through without any



regard for strategy – your only concern will be the seemingly endless stream of enemies. One of the most annoying are Boilers – a big-headed female Chimera that quite literally boil over when they get near you and explode. Their tough bodies make the only real way remove them a headshot, but they're always in groups of at least three and accompanied by the same battle music – every single time.

If you've got some idea of Resistance's canon and are willing to learn the sometimes tricky control scheme then you'll have a fun enough time with this game, and there are a few spectacular cutscenes to draw you in – we just wish it was less repetitive. **(P) JR**

## PSP

**Developer** Sony Bend  
**Publisher** Sony  
**Website** [www.resistance-game.com](http://www.resistance-game.com)

**Graphics**  
For a PSP title this is impressive.

89

**Gameplay**  
You shoot, and run, and shoot, and run....

75

**Sound**  
Accurate and immersive.

84



**Overall**  
A decent portable take on the Resistance world.

81%



# THINGS TO SEE



# Star Trek

We've seen Star Trek, and it is good.

**Distributor** Paramount Pictures **Director** Zack Snyder

**Starring** JJ Abrams Starring: Zachary Quinto, Chris Pine, Karl Urban, Eric Bana

**W**hen JJ Abrams took on the task of directing Star Trek, he wasn't a fan of the original show. But through the filming, and the discovery of the universe so lovingly crafted by Gene Roddenberry and his original cast, Abrams came to appreciate the appeal of what he calls a "very optimistic future, one where race and colour and gender don't matter."

He also kind of fell in love with the starship Enterprise. And so will you – the new Star Trek movie is a wonderful re-imagining of the beloved, though now careworn, franchise.

The action kicks off – and that's no understatement – with the discovery of a vast lightning storm in space by the USS Kelvin, a science vessel on the edge of Federation space. Right away the attention to detail is stunning – the bridge is reminiscent of a cramped submarine, and there are aerials and gritty dials all over the place, the captain of the ship is in science-department blue, and the ship design itself is reminiscent of designs from the classic Starship Battles tabletop and computer games.

If that's not obsessive detail – gloriously obsessive detail! – I don't know what is.

As the Kelvin closes in on the anomaly, a vast presence looms before them, a giant starship that looks like a cross between a Shadow vessel from Babylon 5 and some spiky deep sea creature. The scale is hard to judge, until a long shot shows the shining speck of the Kelvin,

hovering like a minnow compared to the vast bulk of the newcomer. And it's not a friendly newcomer either, opening fire on the Kelvin before summoning its captain to travel over. The rough and ready Romulans on board ask him if he's seen an elder Vulcan around called Ambassador Spock...

The captain, of course, has never heard of Spock. The Romulans ask the captain what stardate it is, and that's when you realise that

things are not what they seem...

This latest Star Trek was always intended as a reboot, and JJ Abrams and his writers have come up with a very clever way to set their take on the universe apart from all the others. It's elegantly explained in the film, too, so even neophytes to Trek's habit of time-travel tales shouldn't feel too out of depth. In fact, one of the things the film does best is meld together the referential and reverential notes that long-time

...JJ Abrams and his writers have come up with a very clever way to set their take on the universe apart from all the others.







and dedicated Trekkies (and I am most certainly one of those) will love, with the kind of action and plotting that even the most Trek-ignorant of people will be unable to resist.

But the most compelling aspect of the film, more than the stunning effects, truly stellar sound work or the incredibly tight writing, is the cast. In every familiar role is an actor confident in their part, though each still manages to bring a certain freshness to characters we know so well. From an eager young Chekov to the swaggering confidence of Jim Kirk, these are the characters that fans have loved for decades, but they are fresh, and ready to be lovingly rediscovered all over again.

Kudos in particular to Karl Urban, who many fans will know well from the second Bourne film and the Lord of the Rings trilogy, who comes to the new Trek as the ever cranky Dr McCoy. He leapt at the chance to play McCoy, and as

one of the few Trek fans in the cast, revelled in the role. "It was so great to take this character that Mr Kelly had done such great work with, for so long," he said when we got a chance to interview the cast and crew the day after seeing the film.

More importantly, what shines through in every scene is that the actors were able to generate that feeling of camaraderie and fellowship that so defined the series and early films. Kirk and Spock in particular, may start the film not on the best of terms (suffice to say we finally see Kirk "beat" the Kobyashi Maru simulation, and Spock is not impressed), but by the end the fledgling friendship is firm and warm.

And so are this fan's feelings for the Star Trek franchise under its new ownership. Abrams, who was in town for the premiere, said to us that it was such a thrill to work with a "great group of young actors; they were exciting to

be with because I knew they had this amazing potential, this great energy."

Thankfully, every bit of that energy, and Abrams' own not inconsiderable skill at telling a story, has come through on screen. Reports have already surfaced that a second film is confirmed – we cannot wait to see what bold new directions the series takes. **DH**

#### Overall

A great new start to the franchise, full of action, thrills and fine performances all round.

**91%**



# Atomic's 100th issue birthday EXTRAVAGANZA!

Atomicans, industry and staff join to celebrate a publishing milestone – and down a lot of beer and pizza!

Let me just say, up front, that my head really, REALLY hurt after this party.

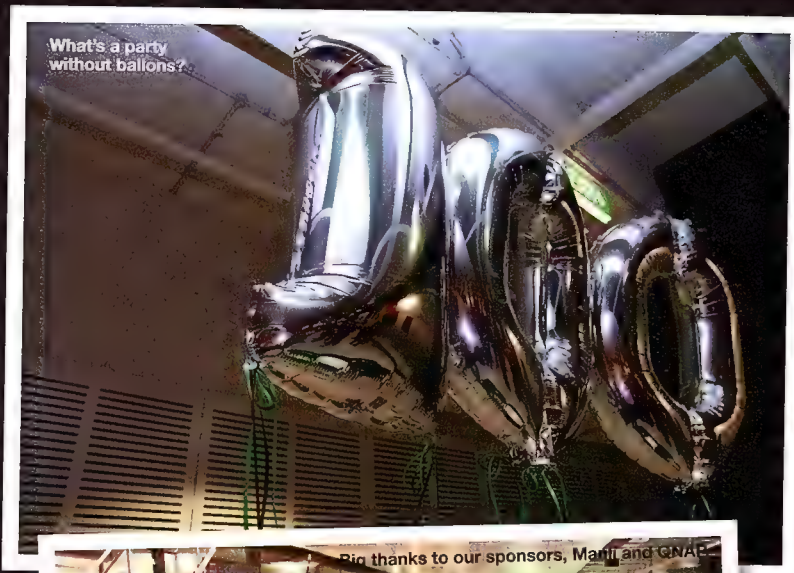
But that's okay, because all the pain was in the cause of a damn fine time on the night of the 23rd of April, as Atomicans and readers, tech industry insiders and Atomic staff past and present gathered for a good old fashioned party. And what a big night it was!

It was the perfect expression of Atomic – good friends, beer and pizza aplenty, cool tech to fondle (thanks again to Manli and QNAP for their generous sponsorship!), and Call of Duty 4 on a ten PC LAN. Even though we had a few no shows, we still made a very big dent on the bar – go Team Green!

Highlights of the night include meeting forumite Krispy89 and seeing him warm up as he got Atomican after Atomican to sign his PC's side panel, walking away with a signed poster of our own (soon to be framed and hung on the wall of Atomic HQ in pride), scrawled on by all the guests, and watching the intense concentration of the guys getting into the LANing. UTS turned out to be an excellent venue, and we hope to use it for similar gatherings in future.

So, thanks to everyone who came and helped us celebrate our mag. As I said on the night, we could not have made it this far without the backing of such a passionate community – cheers to all of you who have helped us reach this milestone. And thanks to Phil Vella and Taline Haroyan, our tireless barstaff, Sam Grimmer, for exceptional photography on the evening, and iamthemaxx for once again lending a hand during setup.

See you at the issue 200 party! 🍷







Atomic Alumni John Gilooly and Ben Mansill share a brew.



Justin Robinson, myself and DesignerDave cut the cake.



Ex and current staff, from Ashton Mills to Zara Baxter. Get it?



# A clock too far Pt. 1

Justin Robinson loses touch.

**H**e slings his backpack down on the floor, leaping with boyish glee into his chair, turning on the three large monitors. A harsh, grinding whirr emanates from beside him; tattered jeans caught in an intake fan, glowing ethereal green beside him. Imposingly blackened, monolithic in size and weight, the captor is not in fact alive – merely his computer.

As the dark room brightens, the man leans back into the butt-grooves in his chair, placing hands on familiar worn tracks on the desk, gripping the mouse and drifting into another world. A better world, without restriction. His world. Hours pass as the man's consciousness loses all awareness of physical surroundings, save for the steady crunching of cheese-covered snacks slowly passing from a greasy bowl to his gaping maw.

This is his ritual every day, lasting long into the night and into the next day, only interrupted by life, and food. He runs the level of tech you'd expect billionaire computer geeks to run, but the rest of his life is squalid – his computer is his life. The upgrade itch burns in him almost constantly, the maddening need to improve always chasing him, sucking away more and more of his money. Then, something stopped.

Netbooks, efficient and light operating systems, and a downturned economy with no sign of changing have ground the tech industry to a halt. There will not be any new releases to sate his dark silicon beast inside, nor any updates to tide it over. This man cannot live for long without improving, his pathological need for more perverts every part of him. Resigned to posting across his social networking sites and forums, the man dejectedly attempts to distract himself... as an unmarked email arrives in one of his many inboxes.

The man has nothing to fear, his array of filters, proxies and bounce-back triple authenticated captchas make the simple task of getting an email to him a level of complexity reserved for decoding the human genome with a pocket calculator. He opens it, noticing a simple string of unintelligible numbers, and one single attached file. Opening the file, a cold blue light washes over his pasty face as schematics appear on his main screen.

Curiously peering at what they reveal, the man's eyes widen. Double and triple checking the data in front of him, he can't believe what he's seeing – complete instructions for building his own zero-phasic energy converter. Scoffing incredulously, he's read ever since primary school that manipulating this kind of energy is not just impossible, but incredibly impractical, and to do so would be reckless even if it were possible. Closing it, he sinks himself back into his

connected life... as the schematic niggles at the back of his mind, joined with the upgrade monster.

Fitfully turning in his messy cot, the man awakens barely an hour into his sleep for the day, unable to turn off thoughts of such a tempting release. Giving in, he stumbles blindly back to the dark room and fumbles for the power switch, pressing it lovingly. Screens flicker for an instant, and snap on (have they ever made that noise before?) with a loud click. The attachment is already open, waiting for his arrival even though he hadn't opened it yet – this is ignored as he wipes a thin coating of sweat from his forehead.


Fervently absorbing the information on his screen, the man assembles the list of components, and collects them throughout his waking and working hours. Returning to the darkened room once more, his usual ritual interrupted by his new fixation, white-hot welding torch lighting brighter than the screens ever did. His work continues into the night; food and rest are waylaid for the maddening whispers always just behind him, seemingly coming from his rig. Driving him on.

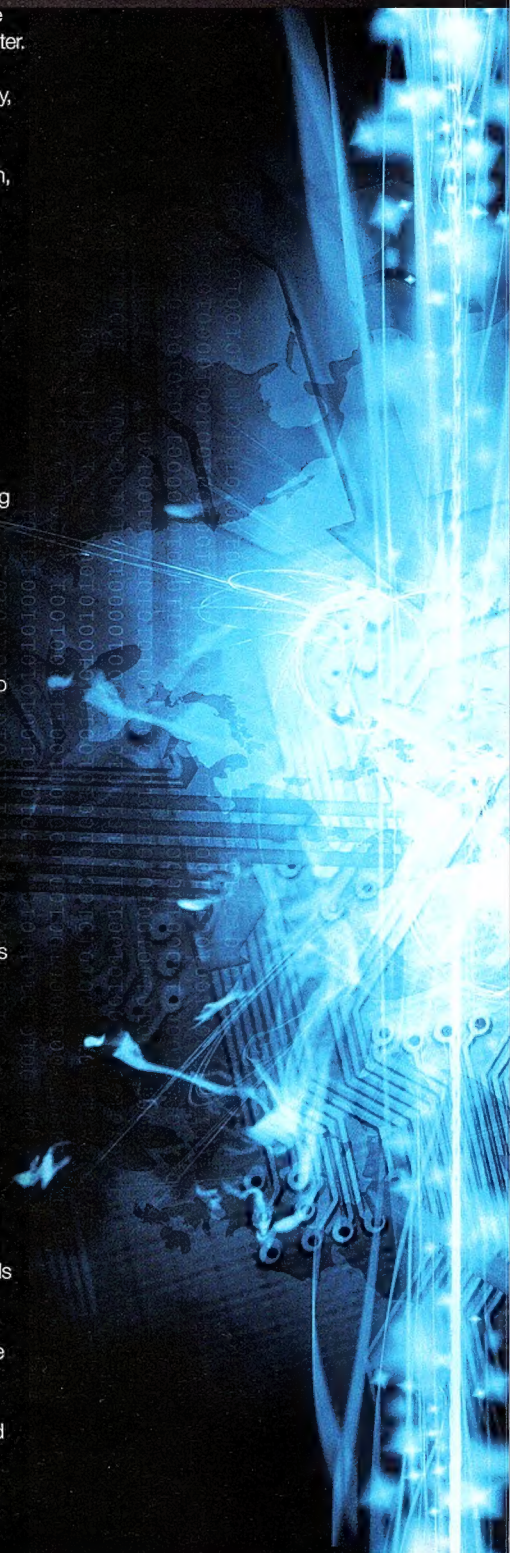
Then, suddenly, the man finishes, placing the last component with a flourish and attaching it to the back of his computer.

Taking the necessary precautions for using such a device, he quickly does up his belt and places his dirty thongs over ankle-high socks, bending down to activate the machine. At first, nothing seems to happen. Then the thrumming noise begins; a terribly loud impossible sound, screechingly harmonious and terrifyingly alien. It forces itself into every one of the man's orifices, vibrating him to the core as it seems to shake his world apart.

Then all at once, all was silent.

Shakingly he attempts the power button again, and all seems normal. Entering the deep blue BIOS screen he notices a menu option that's never been there before, labelled "Sntnc", and activates it. Rebooting quickly, he settles in his groove once more, excitedly awaiting the forthcoming performance hit the same way a junkie awaits their next blast. Amazed, the man has already booted completely into his desktop – five times as fast as it normally takes. He spends all night with the computer, marvelling at the speed, benchmarking to compare performance and telling his online friends just how amazing he is. The time to leave for work arrives much too quickly, and the man runs out the door, leaving the normally dark room still lit by green lights and the screens.

A single message writes itself on the man's chat program "Who am I?", as the door to the room swings closed... 





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